REVISED
RESIDENTIAL PROPERTY
REMOVAL ACTION WORK PLAN
SOUTH PLAINFIELD, NEW JERSEY

Prepared for

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for submission to
USEPA Region II

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EXECUTIVE SUMMARY

The United States Environmental Protection Agency (USEPA) has identified polychlorinated biphenyls (PCBs) in soils at six residential properties in South Plainfield Township, Middlesex County, New Jersey. These properties are located west of the Hamilton Industrial Park, which has recently been placed on the National Priorities List as a federal Superfund site. Removal action activities and site restoration of these six residential properties has been mandated under an Administrative Order of Consent (AOC) issued by USEPA under CERCLA (Index Number II-CERCLA-98-0115). ENVIRON has been retained to manage the removal action and restoration of these properties pursuant to the AOC.

This Removal Action Work Plan has been prepared in accordance with the requirements specified in the AOC. Specifically, this Work Plan defines the scope of activities, and outlines the procedures necessary to complete the removal of soils and restoration of the six properties. These activities include:

- excavation and disposal of PCB-containing soils;
- relocation of residents during removal action activities, as necessary to complete these activities;
- verification sampling to ensure compliance with the AOC-specified cleanup goal for PCBs in soil;
- restoration of properties disturbed as a result of soil removal activities;
- implementation of quality assurance/quality control protocols; and
- implementation of health and safety procedures necessary to protect workers and residents.

On completion of field activities and validation of analytical data, a Final Report will be prepared which documents the work completed pursuant to the AOC.

1.0 INTRODUCTION

1.1 Background

The United States Environmental Protection Agency (USEPA) has identified polychlorinated biphenyls (PCBs) in soils at six residential properties (Properties) in South Plainfield Township, Middlesex County, New Jersey. These properties are located west of the Hamilton Industrial Park, which has recently been placed on the National Priorities List as a federal Superfund site (see Figure 1-1). Removal action activities and site restoration of these six residential properties has been mandated under an Administrative Order of Consent (AOC) issued by USEPA under CERCLA (Index Number II-CERCLA-98-0115). ENVIRON has been retained by Cornell Dubilier Electronics, Inc.(CDE) to manage the removal action and restoration of these properties pursuant to the AOC.

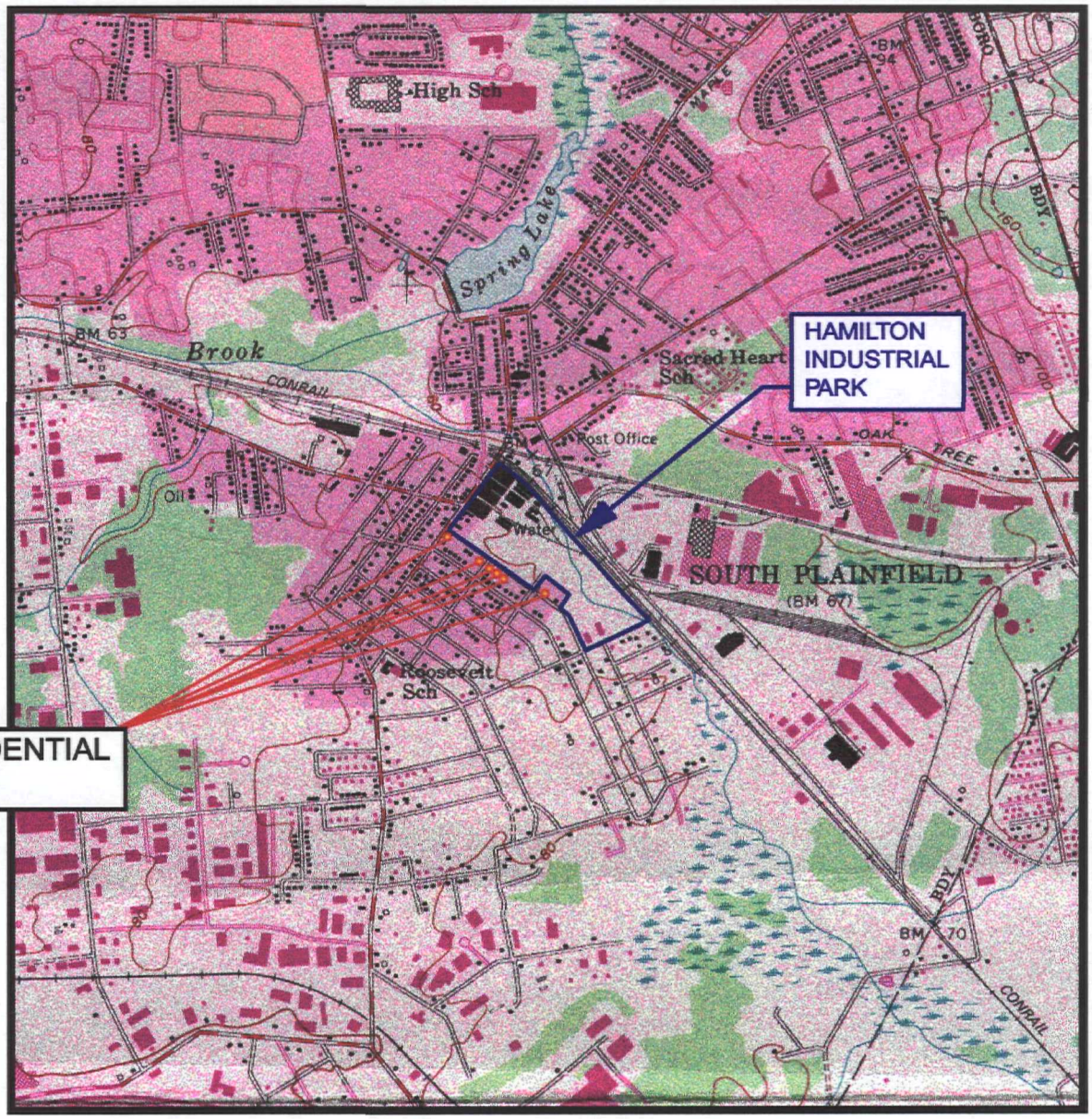
1.2 Site Setting

The Properties are located along Spicer Avenue in South Plainfield Township, Middlesex County, New Jersey. The properties have been designated by USEPA as Properties B, C, E, F, I and N as shown in Figure 1-2. Properties B, C, E, F and N are located directly across Spicer Avenue from Hamilton Industrial Park. Property I is located adjacent to Hamilton Industrial Park.

1.3 Background

Manufacturing operations have been conducted at a facility at 333 Hamilton Boulevard in South Plainfield, New Jersey (now known as the Hamilton Industrial Park) from 1936 to the present. It is alleged that during the operation of the facility, polychlorinated biphenyl (PCB) contaminated materials and other hazardous substances were disposed on-site. USEPA sampling has indicated elevated concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds, PCBs and other constituents in the soils at the Hamilton Industrial Park.

In October 1997, USEPA collected soil samples at residential properties located in the vicinity of the Hamilton Industrial Park. Aroclor-1254 and Aroclor-1260 were detected in the soil samples at concentrations up to 22 mg/kg and 2.2 mg/kg, respectively. On August 7, 1998, an AOC was issued by USEPA requiring sampling, soil remediation and restoration of six residential properties as described in this Work Plan.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE PLAINFIELD, NEW JERSEY; 1955 PHOTOREVISED 1981.

ENVIRON	SITE LOCATION MAP RESIDENTIAL SITES-HAMILTON INDUSTRIAL PARK SOUTH PLAINFIELD, NJ	Figure 1-1	
Drafted By: HFZ	Date: 9/17/98	5840CJ01	

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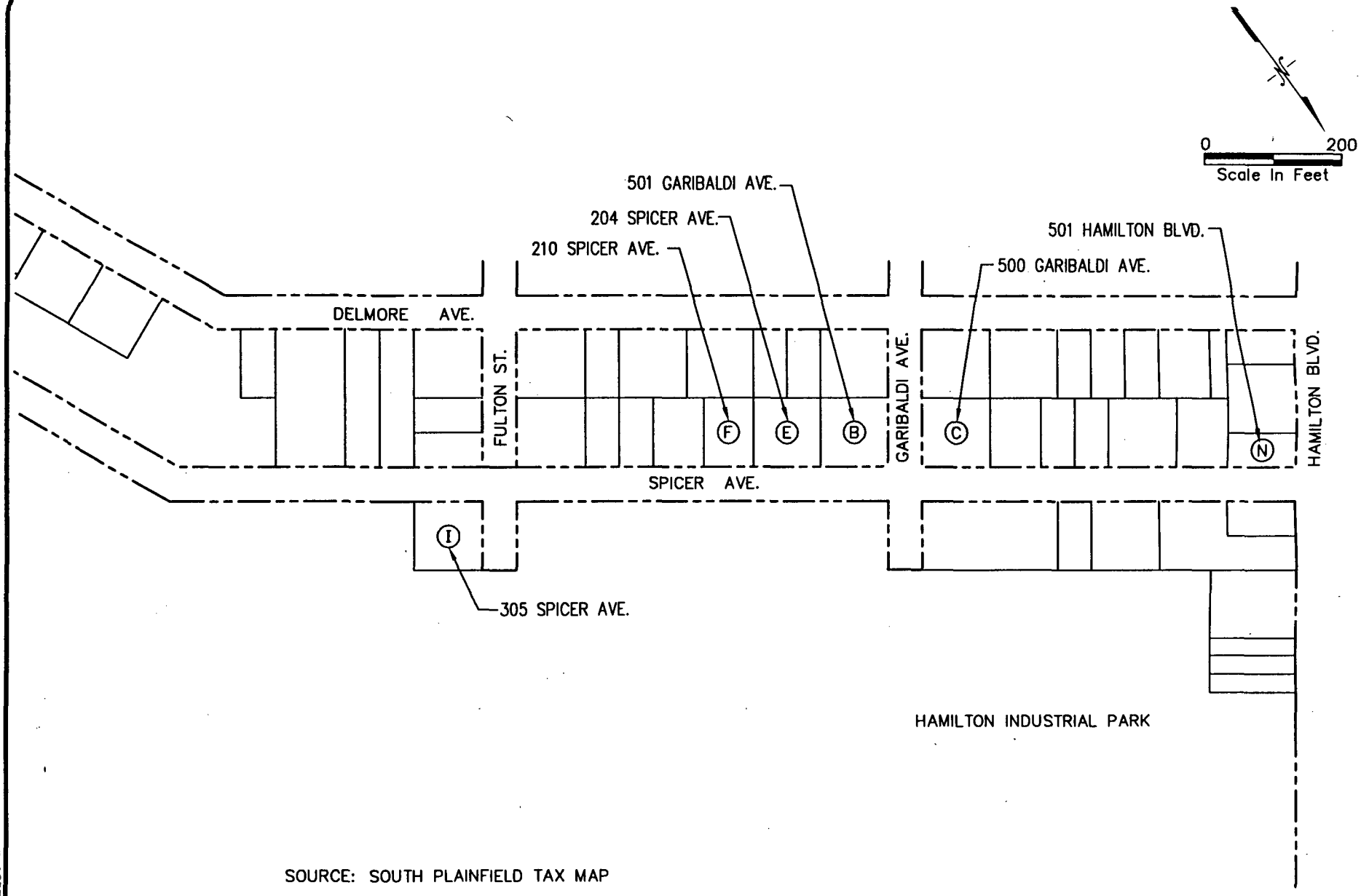

SOURCE: SOUTH PLAINFIELD TAX MAP

ENVIRON

DRAFTED BY: HFZ | DATE: 9/16/98

PROPERTY LOCATION MAP

RESIDENTIAL SITES–HAMILTON INDUSTRIAL PARK
SOUTH PLAINFIELD, NEW JERSEY

FIGURE
1–2

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1.4 Purpose and Scope of Work Plan

The purpose of the Work Plan is to define the scope of activities and procedures necessary to complete the removal action and restoration of the Properties in accordance with the AOC. The main activities comprising the removal action and restoration as specified in the AOC include:

- Delineation of the vertical and horizontal extent of PCB contamination in soil above 1 mg/kg at Property I. Delineation sampling of Property I is described in Section 2.

- Soil sampling to verify attainment of cleanup objectives. Verification sampling is discussed in Section 3.

- Excavation of PCB contaminated soil from Properties B, C, E, F, I and N and subsequent property restoration. Excavation and restoration activities are described in Section 4. Property restoration plans are provided in Appendix B.

- Site preparation and temporary relocation of residents during soil removal and restoration activities as necessary to complete removal action activities. Site preparation and relocation requirements are described in Section 5.

- Off-site disposal of excavated soils. Disposal activities are described in Section 6.

- Implementation of permits and property access necessary to complete removal action activities. Permits and property access issues are described in Section 7.

- Implementation of Quality Assurance/Quality Control (QA/QC) protocols as part of a Quality Assurance Project Plan (QAPP). The QAPP is described in Section 8 and provided as Appendix A.

- Implementation of health and safety procedures for removal action activities. The Health and Safety Plan (HASP) is described in Section 9 and provided as Appendix E.

- Coordination of activities with residents and the community. Community relations are described in Section 10.

2.0 ASSESSMENT OF EXISTING DATA

2.1 Introduction

Shallow surface soil samples were collected for each Property by USEPA in October 1997 to determine the horizontal extent of PCB contamination present. Subsequently, in April 1998 deeper samples were collected by ENVIRON to determine the vertical extent of PCB contamination on each Property. In September 1998, ENVIRON resampled shallow surface soils at Property I and collected additional deeper soil samples, as described below.

Based on the data for shallow soils, the locations identified for soil removal were defined using a statistical analysis designed to ensure that the AOC-specified cleanup criterion would be met following soil excavation; i.e., the 95% upper confidence limit (UCL) of the mean after soil excavation would not exceed the specified cleanup criterion of 1 mg/kg. The depth of soil removal was determined directly from the deeper samples. The delineation methodologies are described in Section 2.3 and 2.4, respectively, and the data analysis results presented in Section 2.5.

2.2 Resampling of Property I

Resampling was conducted at Property I (305 Spicer Avenue) on September 3, 1998 as required by the AOC. Sampling and analysis procedures utilized in this work are provided in the *Sampling and Analysis Plan for 305 Spicer Avenue, South Plainfield, New Jersey*. This plan was submitted to USEPA by ENVIRON in August 1998 and received conditional approval on September 1, 1998. The plan was revised on September 2, 1998 and implemented on September 3, 1998.

2.3 Horizontal Delineation of PCB-Containing Soils

Identification of sample locations to be remediated at each Property[1] was based on surface soil data collected by USEPA in October 1997 on Properties B, C, E, F and N and data collected by ENVIRON in September 1998 on Property I; this evaluation was conducted according to the following data assessment methodology:

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[1] For the purposes of this Work Plan, the term Property includes the residential property lot specified in the AOC and any adjoining area which would be considered part of the apparent limits of residential use associated with the subject property.

Step 1 - Assemble Existing Data Set

The PCB concentrations measured in surface soil samples were assembled to evaluate removal action requirements at each selected property. In case of a non-detected concentration, one-half the detection limit for Aroclor 1254 and Aroclor 1260 was used in all calculations. For duplicate sample pairs, the average of sample pairs was used in the calculations.

Step 2 - Test for Data Distribution

The Shapiro-Wilk test (USEPA, June 1992) was used to determine if the PCB data for a given property follows a normal or log-normal distribution.

Step 3 - Determine Baseline 95% UCL Value

The current (unremediated) 95% UCL value was calculated for each property according to the data distribution identified in Step 2 (USEPA, May 1992).

Step 4 - Identify Sample Locations for Removal Action

Samples were sequentially eliminated from a property data set beginning with samples with the highest concentrations. The reduced data set (i.e., representing the portion of the property that will not require removal action) was retested for distribution type (normal/log-normal), and a new 95% UCL value (i.e., projected post-removal action) was calculated. This process was repeated iteratively until the projected 95% UCL value for the reduced data set no longer exceeded 1 mg/kg.

Step 5 - Definition of Removal Area

Sample locations eliminated from the property data set in Step 4 are designated for soil removal. The exact areas to be excavated are determined in accordance with the procedures described in Section 4.2.

2.4 Vertical Delineation of PCB-Containing Soils

The shallow surface soil samples collected by USEPA in October 1997 were used to determine the location and extent of vertical sampling conducted by ENVIRON in April and September 1998. Two to four deep surface soil samples were collected by ENVIRON at each Property in the vicinity of remedial samples exhibiting the highest PCB concentrations. The April 1998 soil samples were collected at six-inch intervals to depths of two feet below ground surface; based on the April 1998 data, ENVIRON collected samples to a depth of 3 feet at two locations on Property I. Results from these samples were used to estimate the required depth of excavation at each Property as described in Section 4.

2.5 Identification of Remedial Sample Locations

The data assessment process and resulting remediation sample locations are briefly described for each Property in the following sections. Results of the statistical analysis for each Property data set are summarized in Table 2-1.

2.5.1 Property B Remedial Sample Locations

Seventeen shallow surface soil samples and one duplicate sample were collected on Property B by USEPA. Data for these shallow surface soil samples were statistically analyzed as described in Section 2.3. Six (6) of the 17 samples were removed from the data set in order to meet the cleanup goal. Sample locations, including the 6 sample locations identified for removal, are shown in Figure 2-1.

2.5.2 Property C Remedial Sample Locations

Twenty-two shallow surface soil samples and one duplicate sample were collected on Property C by USEPA. Data for the shallow surface soil samples were statistically analyzed as described in Section 2.3. Eight (8) of the 22 samples were removed from the data set in order to meet the cleanup goal. Sample locations, including the 8 sample locations identified for removal, are shown in Figure 2-2.

2.5.3 Property E Remedial Sample Locations

Nineteen shallow surface soil samples and one duplicate sample were collected on Property E by USEPA. Data for the shallow surface soil samples were statistically analyzed as described in Section 2.3. All of the 19 samples were removed from the data set, as all of the sample concentrations exceeded the cleanup goal. Sample locations, including the 19 sample locations identified for removal, are shown in Figure 2-3.

2.5.4 Property F Remedial Sample Locations

Nineteen shallow surface soil samples and one duplicate sample were collected on Property F by USEPA. Data for the shallow surface soil samples were statistically analyzed as described in Section 2.3. Eleven (11) of the 19 samples were removed from the data set in order to meet the cleanup goal. Sample locations, including the 11 sample locations identified for removal, are shown in Figure 2-4.

TABLE 2-1:
Statistical Analysis of Property Characterization Data

Property	Number of Samples Used in the Statistical Analysis	Function Distribution	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% Upper Confidence Level of the Mean
B	17	Not Normal	10.5			
		Log-Normal		1.11	4.41	12.1
Remove CDB015, CDB016,CDB011,CDB017,CDB008, CDB009						
B	**11**	**Normal**	**1.7**	**0.74**	**0.56**	**1.0**
		Log-Normal				
C	22	Not Normal	21			
		Log-Normal		0.66	6.45	18.1
Remove: CDC014,CDC001_23,CDC011, CDC012,CDC020, CDC018,CDC015,CDC013						
C	**14**	**Normal**	**1.3**	**0.42**	**0.40**	**0.6**
		Log-Normal				
E	19	**Normal**	22	10.83	4.69	12.7
		Log-Normal				
Remove all samples:						
E	**0**	**NA**	**NA**	**NA**	**NA**	**NA**
F	19	Not Normal	6.9	NC	NC	NC
		Not Log-Normal				
Remove: CDF010, CDF009, CDF017,CDF008,CDF015,CDF002, CDF011,CDF001_20, CDF013, CDF016, CDF018						
F	**8**	**Not Normal**	1	**NC**	**NC**	**NC**
		Not Log-Normal				
I	24	Not Normal	35			
		Log-Normal		1.25	4.56	11.0
Remove CDI024, CDI004, CDI022_22D, CDI007, CDI009, CDI008, CDI016, CDI005, CDI006, CDI002 OR CDI018						
I	**14**	**Normal**	1.4	0.69	0.49	0.9
		Log-Normal				
N	20	Not Normal	6.8			
		Log-Normal		1.47	1.86	5.5
Remove CDN014, CDN011, CDN004, CDN003, CDN019, CDN006, CDN013, CDN005, CDN015, CDN018, CDN001, CDN010						
N	8	**Normal**	**1.19**	**0.88**	**0.19**	**1.0**
		Log-Normal				

Notes:

NC - Not calculated because data set was not normal or log-normal.
The average of duplicate samples was used in the statistical analysis.
One-half the detection limit was used for non-detected results.
Property I statistics reflect validated data for samples collected by ENVIRON on September 3, 1998.

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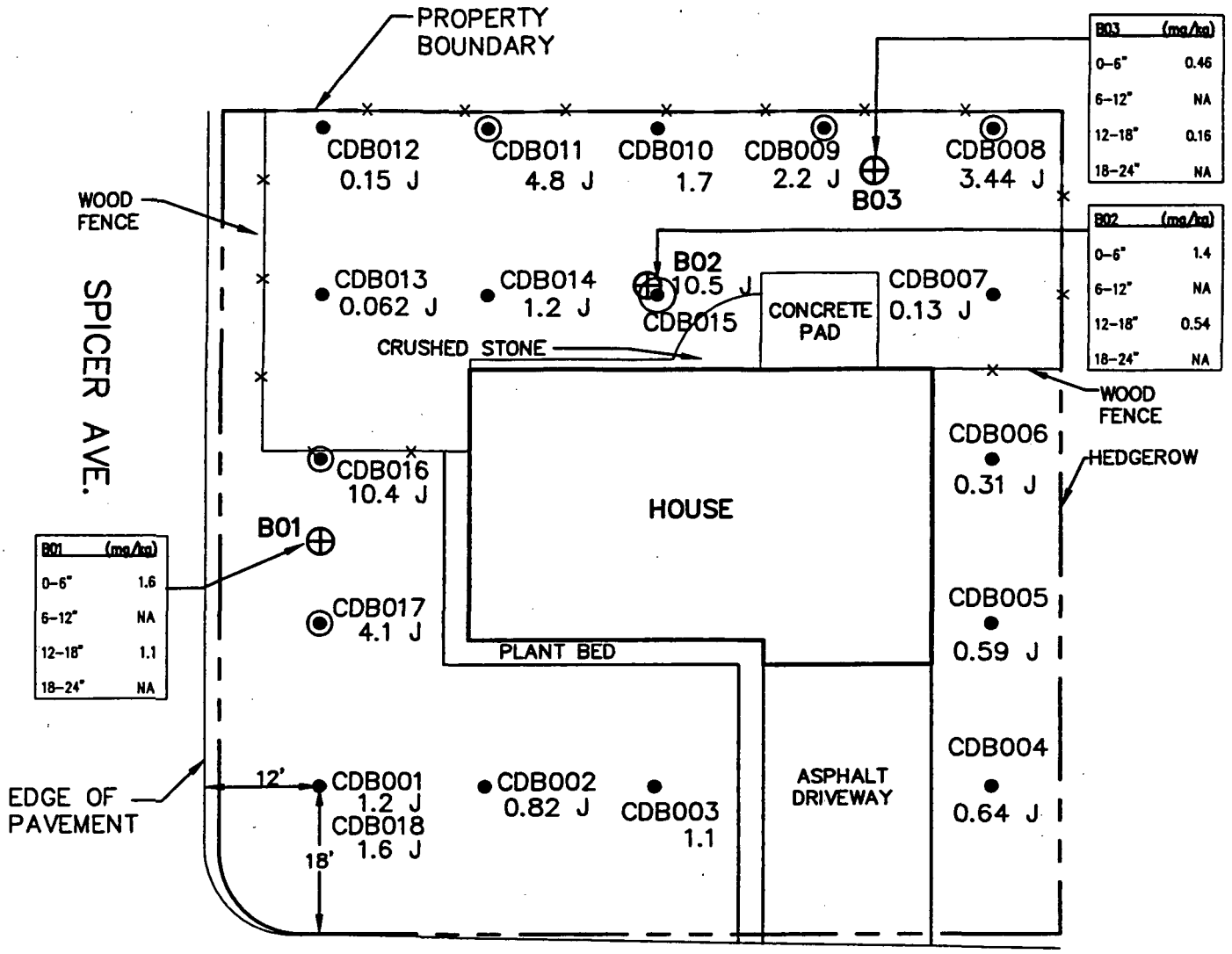

GARIBALDI AVE.

LEGEND

CDB017 ●	EPA SAMPLES (10/27/97), 0-2"
B01 ⊕	ENVIRON SAMPLES (4/98), DEPTH AS SHOWN
1.7	TOTAL AROCLOR CONCENTRATIONS IN mg/kg
4.8 J	ESTIMATED CONCENTRATIONS
○	SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

0 20
Scale In Feet

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON

DRAFTED BY: KPM/TJF | DATE: 9/25/98

SOIL SAMPLE LOCATIONS AT PROPERTY B
501 GARIBALDI AVE.
SOUTH PLAINFIELD, NEW JERSEY

FIGURE 2-1

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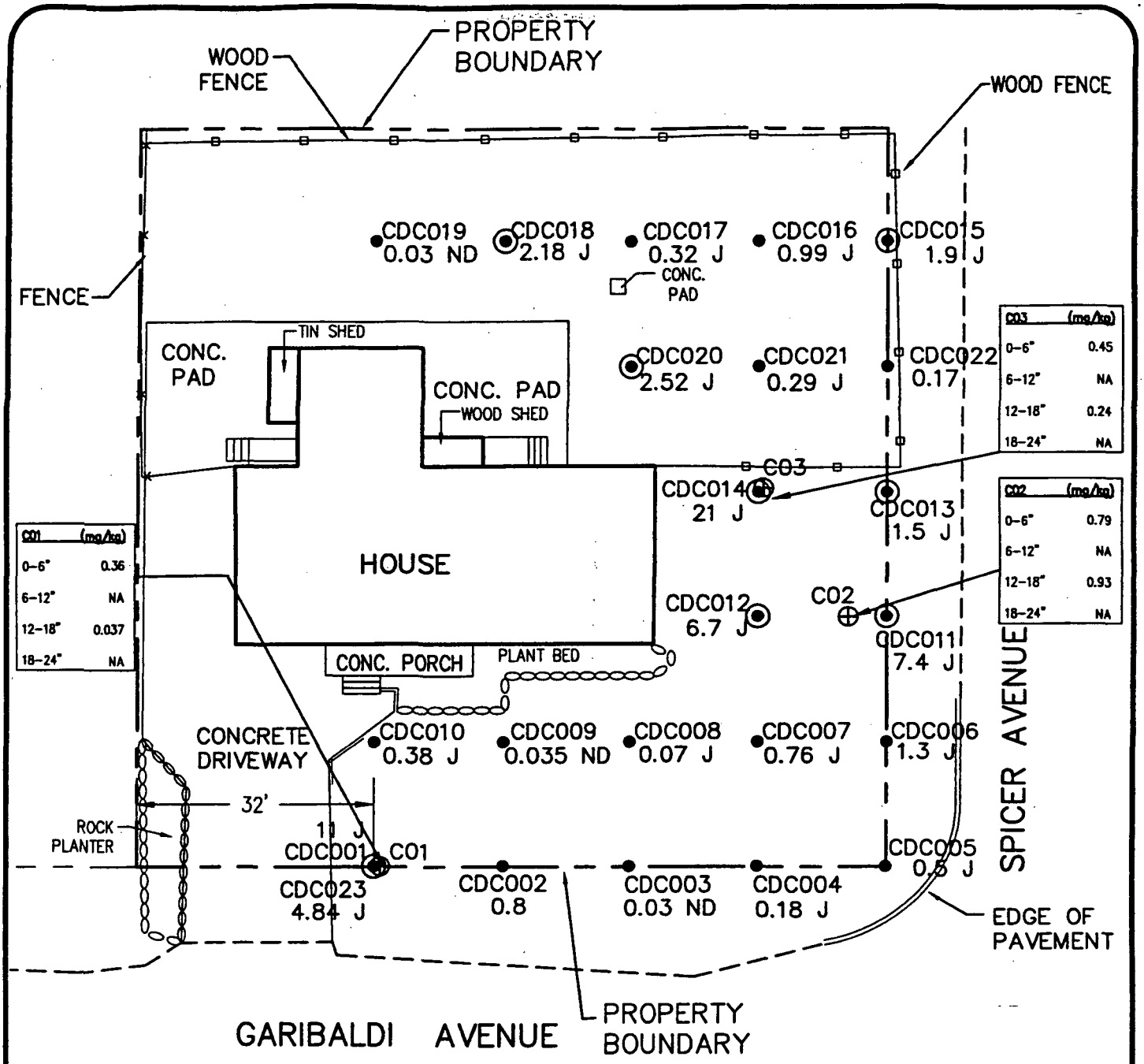

LEGEND

CDC017●	EPA SAMPLES (10/27/97), 0–2"
C01⊕	ENVIRON SAMPLES (4/98), DEPTH AS SHOWN
6.7 J	ESTIMATED VALUES OF TOTAL AROCLOR CONCENTRATIONS IN mg/kg
0.03 ND	NOT DETECTED; VALUE REPRESENTS HALF OF DETECTION LIMIT
○	SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

0 20
Scale In Feet

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON

DRAFTED BY: KPM/TJF | DATE: 9/25/98

SOIL SAMPLE LOCATIONS AT PROPERTY C
500 GARIBALDI AVE.
SOUTH PLAINFIELD, NEW JERSEY

FIGURE 2-2

5840AS6B

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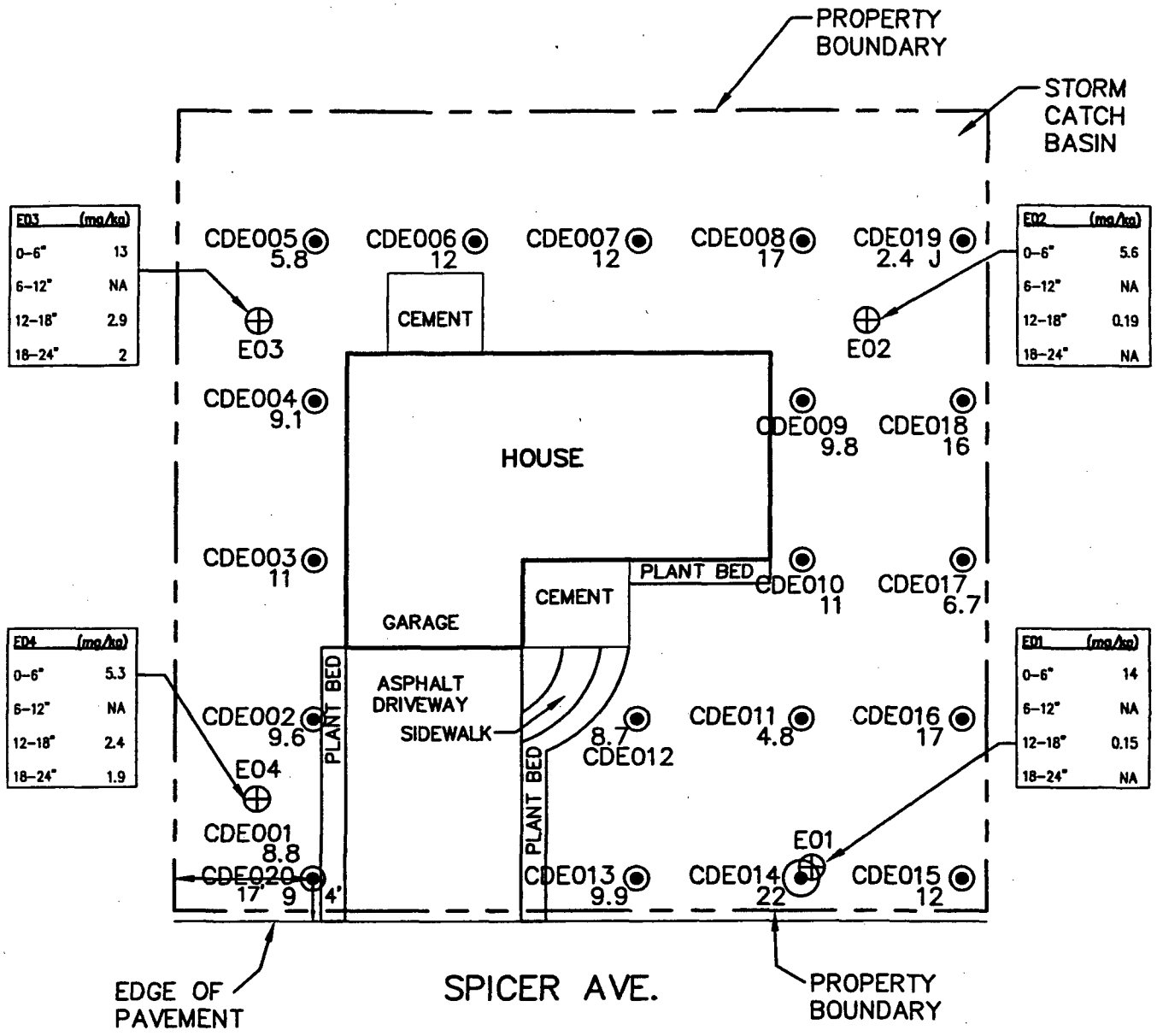

LEGEND

CDE017● EPA SAMPLES (10/27/97), 0-2"

E01⊕ ENVIRON SAMPLES (4/98), DEPTH AS SHOWN

8.7 TOTAL AROCLOR CONCENTRATIONS IN mg/kg

2.4 J ESTIMATED CONCENTRATIONS

○ SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

0 20
Scale In Feet

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	SOIL SAMPLE LOCATIONS AT PROPERTY E 204 SPICER AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 2-3
DRAFTED BY: TJF/CCG | DATE: 11/5/98		5840AS6C

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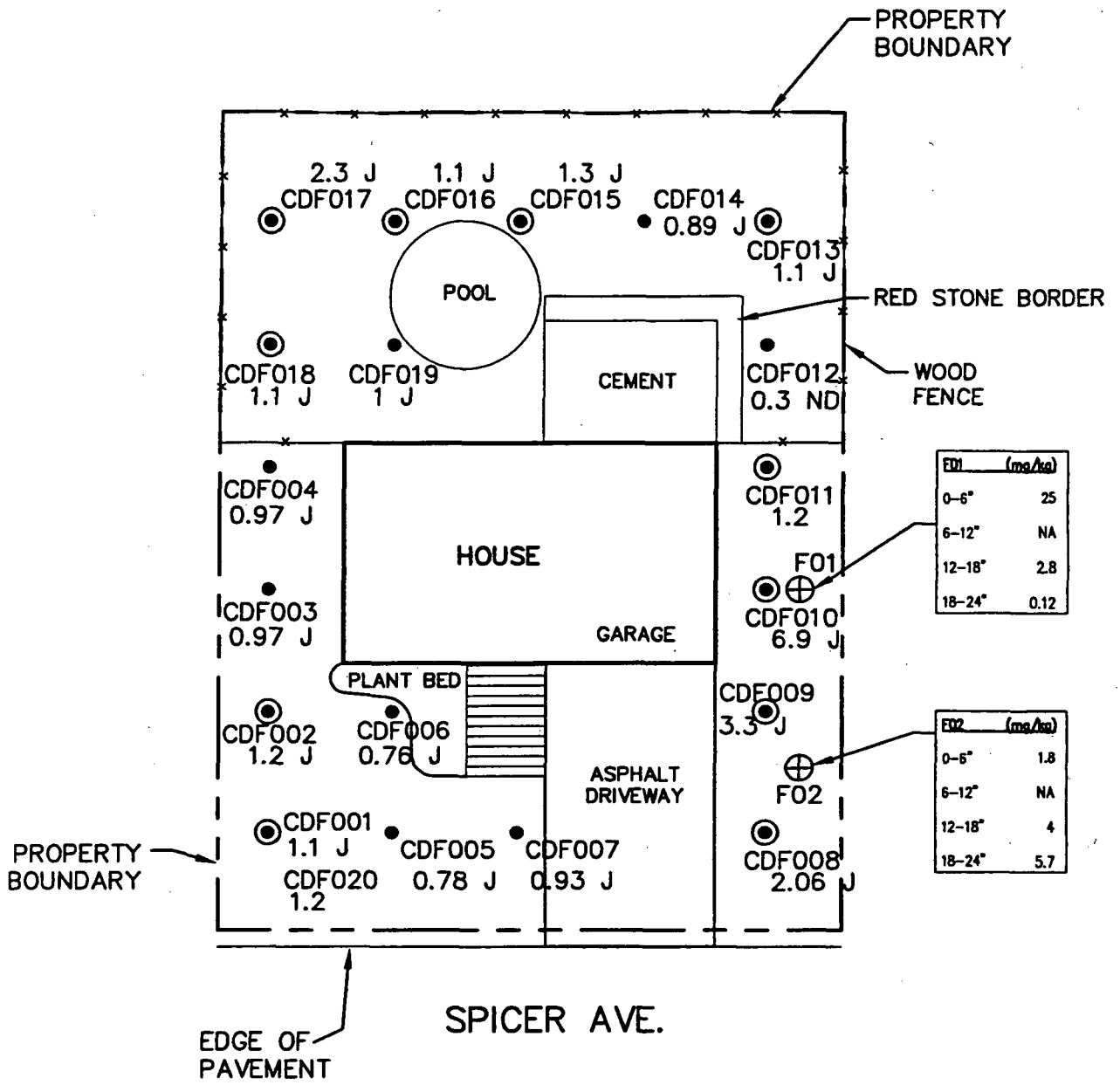

LEGEND

CDF017● EPA SAMPLES (10/27/97), 0-2"

F01⊕ ENVIRON SAMPLES (4/98), DEPTH AS SHOWN

1.2 TOTAL AROCLOR CONCENTRATIONS IN mg/kg

1.2 J ESTIMATED CONCENTRATIONS

0.3 ND NOT DETECTED; VALUE REPRESENTS HALF OF DETECTION LIMIT

○ SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

0 20
Scale In Feet

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	SOIL SAMPLE LOCATIONS AT PROPERTY F 210 SPICER AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 2-4
DRAFTED BY: TJF / DATE: 9/25/98		5840AS6D

2.5.5 Property I Remedial Sample Locations

Twenty-four shallow surface soil samples and two duplicate samples were collected on Property I by ENVIRON. Data for the shallow surface samples were statistically analyzed as described in Section 2.3. Ten (10) of the 24 samples were removed from the data set in order to meet the cleanup goal. Sample locations, including the 10 sample locations identified for removal, are shown in Figure 2-5.

2.5.6 Property N Remedial Sample Locations

Twenty shallow surface soil samples and one duplicate sample were collected on Property N by USEPA. Data for the shallow surface soil samples were statistically analyzed as described in Section 2.3. Twelve (12) of the 20 samples were removed from the data set in order to meet the cleanup goal. Sample locations, including the 12 sample locations identified for removal, are shown in Figure 2-6.

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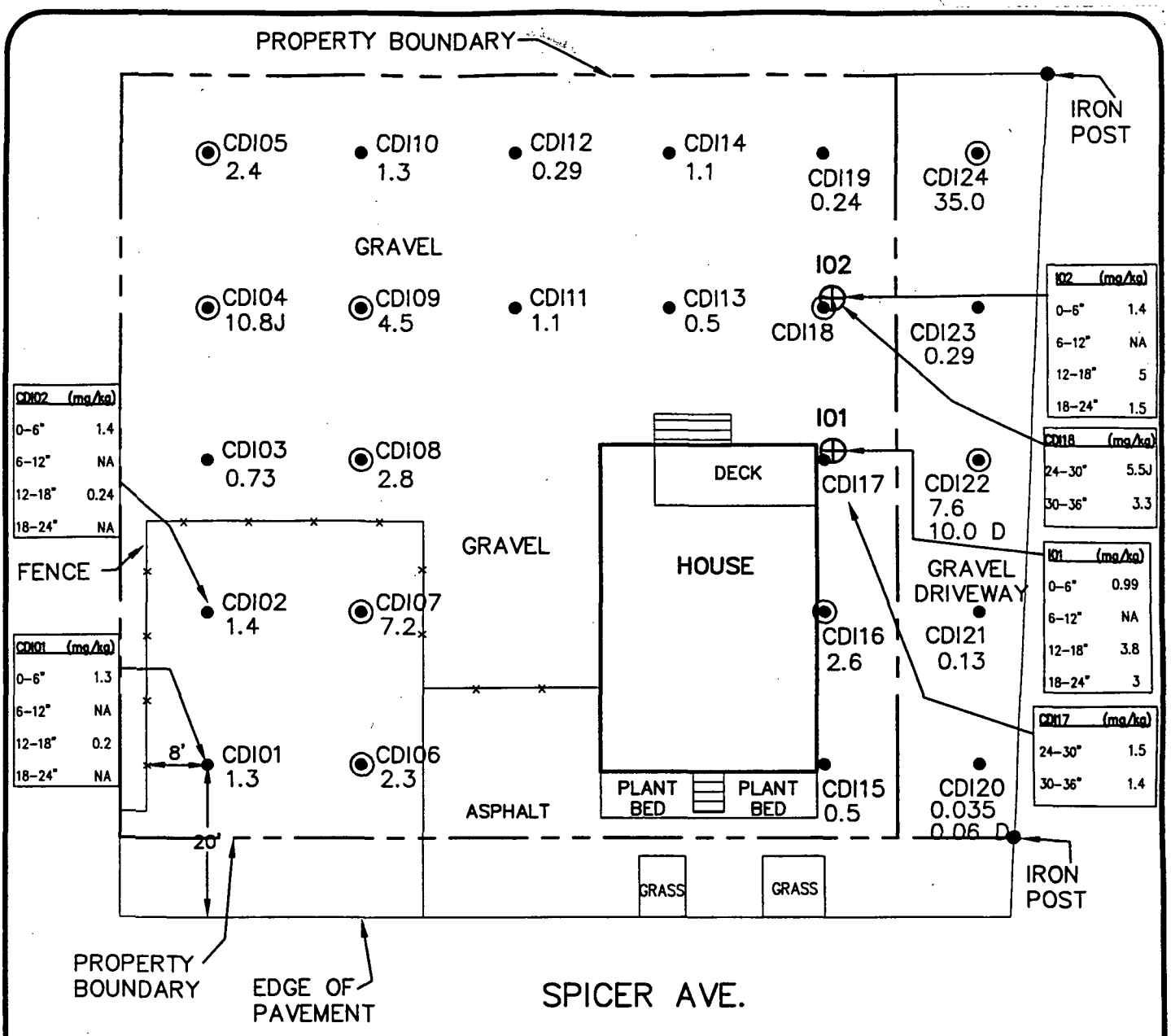

LEGEND

CDI017 ●	ENVIRON SAMPLES (9/98), 0-6" OR AS SHOWN
I01 ⊕	ENVIRON SAMPLES (4/98-9/98), DEPTH AS SHOWN
1.6	TOTAL AROCLOR CONCENTRATIONS IN mg/kg
1.6 D	TOTAL AROCLOR CONCENTRATIONS IN DUPLICATE SAMPLE (mg/kg)
10.8 J	ESTIMATED CONCENTRATIONS
○	SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

0 20
Scale In Feet

NOTES: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON

DRAFTED BY: TJF | DATE: 9/25/98

SOIL SAMPLE LOCATIONS AT PROPERTY I

305 SPICER AVE.
SOUTH PLAINFIELD, NEW JERSEY

FIGURE 2-5

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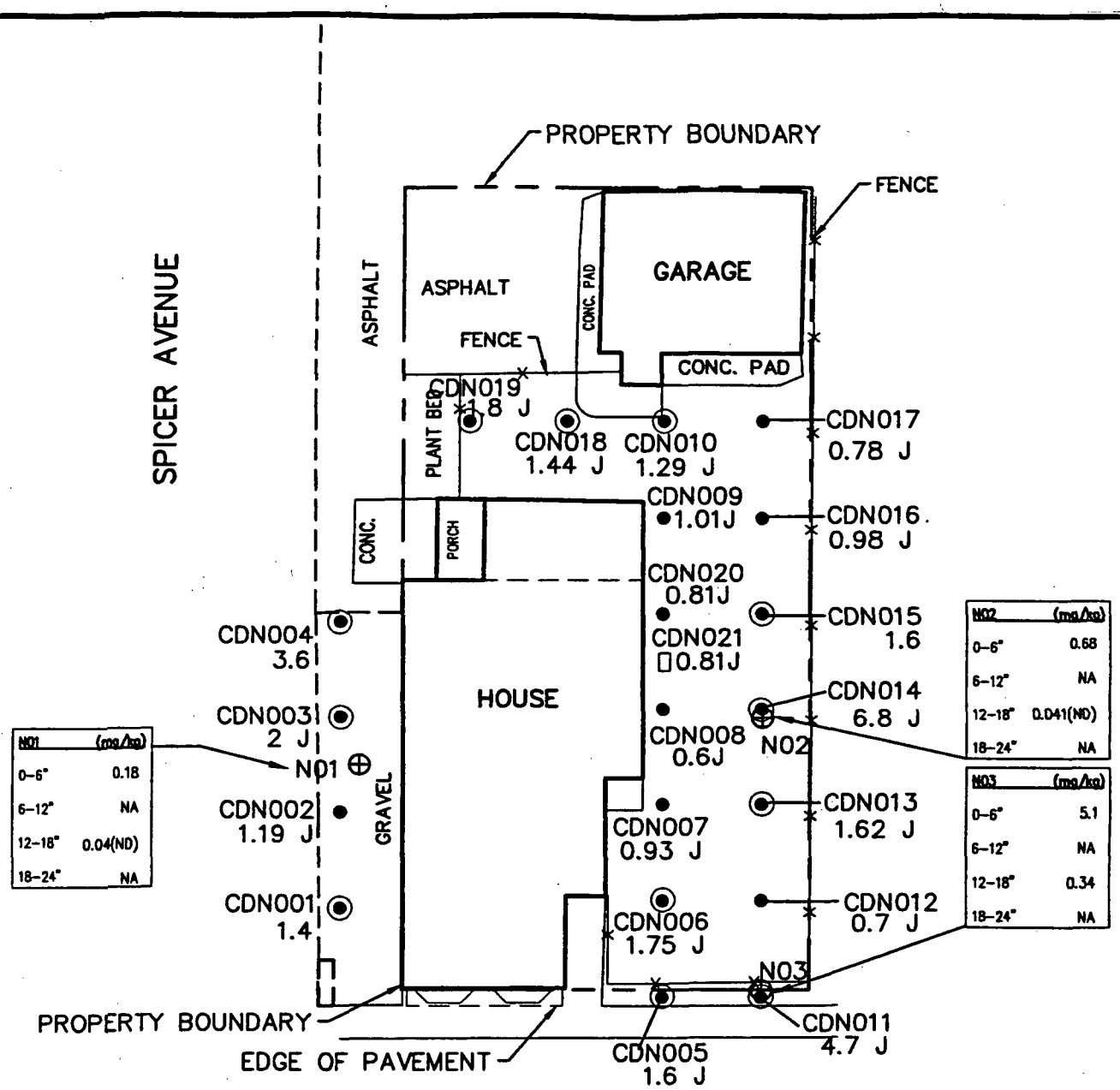

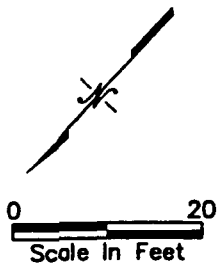

LEGEND

CDN017● EPA SAMPLES (10/27/97), 0-2"

N02⊕ ENVIRON SAMPLES (4/98), DEPTH AS SHOWN

4.8 TOTAL AROCLOR CONCENTRATIONS IN mg/kg

1.6 J ESTIMATED CONCENTRATIONS

○ SAMPLE LOCATION IDENTIFIED FOR REMOVAL ACTION

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	SOIL SAMPLE LOCATIONS AT PROPERTY N 501 HAMILTON BLVD. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 2-6	
DRAFTED BY: TJF	DATE: 9/25/98		5840AS6F

3.0 SAMPLING AND ANALYSIS PLAN (SAP)

3.1 Objectives

The sampling and analysis plan (SAP) describes the detailed procedures and methods to be implemented to sample soil and wastes generated during removal action activities to be conducted at the Properties. The SAP addresses the following elements:

- Excavation verification sampling requirements;
- Disposal sampling requirements;
- Standard field sampling and sampling decontamination protocols;
- Sample management; and
- Laboratory analytical methods.

Air monitoring and analysis procedures are included in the HASP described in Section 9 and included as Appendix E.

The SAP includes standard sampling and analysis procedures, sample management procedures, and incorporates USEPA Chain of Custody procedures, as set forth in the *National Enforcement Investigations Center Policies and Procedures Manual* (revised November, 1984) the *National Enforcement Investigations Center Manual for the Evidence Audit* (September, 1981), and SW-846.

3.2 Proposed Verification Sample Collection

According to the AOC, sampling must be performed to verify attainment of the cleanup criterion. In order to facilitate the excavation and backfilling processes, and to minimize the inconvenience and impact on the people residing at the properties where soil excavation is to be performed, the verification sampling will be conducted prior to excavation rather than in the conventional post-excavation manner. In accordance with the AOC, verification sampling will at a minimum include:

- The collection of one sample from the excavation bottom for every 900 square feet of bottom area.

- The collection of one sample at the bottom of each sidewall for every thirty (30) linear feet of sidewall.

The bottom verification samples will be collected as grab samples from the six-inch interval below the proposed excavation depths.

The sidewall verification samples will be collected as grab samples from the sides of the proposed excavation areas at the six-inch interval above the proposed bottom depth of the excavation areas. Verification sidewall sampling will include the collection of a sample from a 0- to 6-inch depth in addition to the sample to be collected at the depth of the bottom of the excavation. The purpose of the 0- to 6-inch surface soil sample is to verify the horizontal surficial limits of excavation. Alternatively, and at its discretion, CDE may choose to extend the excavation to the nearest horizontal barrier (i.e., existing pavement or physical structure), to the limit of apparent residential use (including fencelines), or existing surface sample location not identified for excavation. For the cases where excavations extend to a horizontal barrier, no sidewall verification sampling will be conducted, as the excavation has been extended to a point at which no direct exposure to soil exists (i.e., pavement eliminated direct contact). Similarly, no sidewall samples will be collected where the excavations extend to the limit of residential use associated with the subject Property. For excavations extended to the nearest surface soil sample not identified for excavation, the 0- to 6-inch sidewall sample will not be collected.

In addition, supplemental samples will be collected outside the proposed excavation area and held by the analytical laboratory for possible future analysis. Supplemental sidewall samples will be collected one to two feet away from the initial sidewall verification sample locations. Similarly, bottom supplemental samples will be collected at additional depth intervals beneath the proposed excavation depths. The supplemental samples will not be analyzed unless the initial verification samples exhibit concentrations that result in a statistical exceedance of the cleanup level. In this case, the supplemental samples adjacent to the subject initial samples will be analyzed to determine the degree of additional excavation required.

Upon request by USEPA, CDE will provide USEPA or its designated representatives with duplicate and/or split samples of any material sampled in connection with the implementation of the AOC.

3.2.1 Verification Sampling: Bottom Area Sample Locations

The following steps will be used to identify sample locations at the bottom of each excavation area:

- For each distinct excavation area within a property, the total excavation area will be determined.
- The number of excavation bottom samples will be computed by dividing the excavation area by 900. Any fraction will be rounded up to the nearest whole number.
- The appropriate number of samples will be positioned in central locations, offset from any deep sample locations previously sampled by ENVIRON, throughout each excavation area.

3.2.2 Verification Sampling: Sidewall Sample Locations

The following steps will be used to identify sample locations along each excavation sidewall:

- The total linear feet of the excavation boundary to be sampled will be determined. This excludes sidewalls adjacent to houses, paved areas and residential use boundaries associated with the subject Property.
- The number of sidewall samples required will be computed by dividing the total linear feet of sidewall (as determined above) by 30 and by rounding up any fraction to the nearest whole number.
- The appropriate number of samples will be evenly distributed along the sidewall. If only one sample is to be collected, the sample will be positioned in the center of the section. If two or more samples are to be collected, the samples will be spaced apart such that the distance between each end sample and the sidewall border is equal to the distance between each sample.

3.3 Disposal Sample Collection

One disposal facility and one treatment and disposal facility have been identified for final disposal of remediation waste as described in Section 6. Each of these facilities has been contacted regarding pre-acceptance waste sampling and characterization requirements. The

data collected as part of the completed sampling program described in Section 2 is expected to satisfy the frequency of sampling required for characterization of PCB concentrations in soils for disposal purposes. Composite soil samples are required by one of the facilities for other waste characterization parameters; these composite samples will be collected and analyzed in accordance with the facility's requirements.

3.4 Field Procedures

This section describes the general approach for implementing field sampling activities for the collection of verification soil samples from each Property; standard sampling procedures are provided in Appendix A.1. The following field protocol will be used.

3.4.1 Shallow Surface Soil Sampling

Shallow surface soil samples will be collected from 0 to 6 inches below any surface cover (i.e. gravel) using a clean hand trowel or hand auger. The trowel or auger will be decontaminated between each sample, following the procedures described in Section 3.4.3 below.

3.4.2 Deep Soil Sampling

Soil samples from below a depth of 6 inches will be collected using a clean hand auger. Soils will be collected from an interval of 0 to 6 inches at the specified depth. The hand auger will be decontaminated between each sample interval, following the procedures described in Section 3.4.3 below. For samples to be collected only from a single discrete interval, one auger may be used until the top of the sampling interval is reached, and then a new decontaminated auger will be used to collect the sample.

3.4.3 Sampling Equipment Decontamination Procedures

All sampling equipment will be decontaminated prior to use and will arrive on-site in clean condition. All sampling equipment will also be decontaminated between each use using the following or equivalent procedure:

- Place dirty equipment on plastic ground sheet or in similar containment area;
- Wash thoroughly with a laboratory detergent (Alconox or equivalent) to remove any particulate matter and/or surface films using bristle brush, as needed (sampling equipment with oil or other hard to remove materials may require rinsing with isopropanol prior to washing with the detergent solution);

- Rinse thoroughly with clean potable water;
- Rinse thoroughly with clean deionized water;
- Air-dry; and
- Wrap decontaminated equipment in aluminum foil (shiny side out) for storage and transportation.

Prior to implementing decontamination of the sampling equipment, a location within the sampling area will be designated for these activities. Wash water will be allowed to evaporate or infiltrate into the ground.

3.4.4 Sample Management

ENVIRON sample management procedures are described in detail in Appendix A.1 and are summarized below. These procedures are equivalent to those provided in *NEIC Policies and Procedures*, May 1978 [Revised August 1991].

ENVIRON personnel will keep a bound field notebook recording all activities at the Properties, including sample collection and tracking information. All samples submitted for analysis under this plan will be collected and shipped by ENVIRON personnel. A unique sample code will be assigned to each sample collected. This code will consist of different parts to identify the site, sample media, sample location, and the sample type (i.e., environmental, duplicate sample, field blank, etc.). Sample types and location designations in the sample code will be such that they will be compatible with the site and overall project data base system. The codes and their representation are defined in Table 3-1.

All sampling containers and preservatives will be provided by a designated laboratory. Samples will be stored in coolers until they can be shipped to the laboratory. Samples will be transported from the field to the designated laboratory using an overnight carrier service. All sample containers will be shipped with chain-of-custody records. A separate chain-of-custody will accompany each cooler. These chain-of-custody records will be completed by the field sampling personnel and returned with the samples. All samples shipped to the designated laboratory will be packaged and shipped as excluded materials (as defined in 40 CFR Part 261.4). Sample packaging procedures will comply with all U.S. Department of Transportation (DOT) requirements and International Air Transport Association (IATA) standards, as detailed in the most current edition of the IATA *Dangerous Goods Regulations* for hazardous materials shipment.

Upon sample receipt at the designated laboratory, all sample collection dates are to be noted by the sample custodian. The required date for completion of analysis (or extraction) will be noted and keyed to the holding time. A Laboratory Project Manager will have been assigned and will be responsible for ensuring proper execution of all required analyses.

3.5 Laboratory Analytical Methods

Soil samples will be analyzed for PCBs. All analyses for PCBs will comply with the analytical procedures presented in USEPA's *Test Methods for Evaluating Solid Waste (Physical/Chemical Methods)*, SW-846, Third Edition, September 1986. Method 8082 (Revision 0, December 1996) will be used for PCB analyses. See Table 3-2 for sample preservation, containers and holding times for the specified analyses.

TABLE 3-1
Sample Designation Format

Example: C-0A-01-DS-01-MS	
C-	Property C
-0A-	Excavation Area A
-01-	Verification Sample Location
	Soil Sample Type:
-DS-	discrete soil sample
-CS-	composite soil sample
	Sampling Depth Interval:
-01-	0 to 6 inches below ground surface (bgs)
-02-	6 to 12 inches bgs
-03-	12 to 18 inches bgs
-04-	18 to 24 inches bgs
-05-	24 to 30 inches bgs
-06-	30 to 36 inches bgs
-MS	QA/QC Designation (as needed; see Appendix A.1 for QA/QC designations)

TABLE 3-2

Sample Preservation, Containers and Holding Times for Specified Analyses

Laboratory Analysis	Analytical Method	Matrix	Preservative[1]	Container	Analytical Hold Time
Polychlorinated Biphenyls (PCBs)	SW-846 8082	sediment or soil	none	8 oz. sample jar	14 days
Polychlorinated Biphenyls (PCBs)	SW-846 8082	water	none	1 L amber glass bottle	7 days

Note:

(1) All samples must be cooled to 4°C; additional preservatives as noted.

4.0 EXCAVATION AND RESTORATION PLAN

4.1 Introduction

Proposed areas and depths of excavation have been delineated for each Property based on existing sampling data and the data assessment methodology described in Section 2. Verification sampling is proposed to be completed prior to excavation in order to verify the limits of excavation and minimize the duration of open excavation on each property. The results of this sampling will be used to refine the excavation depths and areas as described in this section.

4.2 Scope of Excavation

The sampling data identified in Section 2.1 will be combined with final verification sample data collected according to the methodology described in Section 3.2 and analyzed using the data assessment methodology described in Section 2.3. The results of the combined data assessment will be used to determine the final extent of excavation at each Property. Excavation areas and volumes will then be defined as described in this section.

Based on an evaluation of soil characterization data collected as part of other CERCLA PCB characterization programs, ENVIRON has developed an approach for preparing preliminary estimates of the areal extent of PCBs in soils. The principal finding from this experience is that no linear trends between sampling points can generally be established. Hence, for preliminary estimation purposes, no linear interpolation between data points is performed. Rather, the following approach is applied for the preparation of removal action area estimates:

- As a simplifying step, the removal action area associated with a given sample location is considered to be rectangular.

- Horizontal boundaries of PCB removal action areas are established midway between contiguous sampling points. Barriers such as walls and pavement boundaries, where present, and the Property boundaries (or associated limits of residential use) are also taken to be horizontal boundaries.

- Vertical boundaries of PCB removal action areas are determined by the analytical results of the nearest vertical soil sample collected during pre-excavation sampling. Vertical boundaries are established at the lowest interval depth with the highest PCB concentration below or equal to 1 mg/kg. If the lowest interval depth demonstrated PCB concentrations above 1 mg/kg, the depth of the associated remediation area will be defined six (6) inches below the limits of the vertical soil sample.

- Additional area between separate delineated excavation areas, and between delineated excavation areas and horizontal barriers or residential use limits, may also be excavated to eliminate or reduce the number of verification samples. These additional areas will be identified on a case-by-case basis. Verification sampling may be performed in these additional areas, on a case-by-case basis, as described in Section 4.4.

4.3 Statistical Identification of Remedial Excavation Limits

Prior to removal action, verification samples will be collected from the base and sidewalls of each proposed excavation area in accordance with the excavation verification procedures described in Section 3.2. The extent of required excavation will be determined by statistical analysis in accordance with Section 2.3. Specifically, the verification data obtained from sampling on each property will be combined with the remaining surface soil sample data from the portion of the property that remains unexcavated. The combined data set will then be tested for a normal and log-normal distribution, and a new 95% UCL of the arithmetic mean PCB concentration for the property will be calculated.

In the case where the 95% UCL value for a property exceeds 1 mg/kg, laboratory analysis will be conducted on the supplemental samples collected adjacent to those initial verification samples that must be excluded from the statistical data set in order to meet the cleanup criterion. The supplemental sampling data will replace the associated initial verification sampling data and the statistical analysis will be conducted with the new data set. Alternatively, if the 95% UCL value is less than or equal to 1 mg/kg, the initial verification samples will be used to define the soil removal boundaries.

4.4 Excavation Procedures

Each Property will be prepared prior to excavation in accordance with the procedures described in Section 5. The contractor will then measure and stake out the excavation areas identified by ENVIRON on each Property. Removal of soil and vegetation will be performed using machine or manual excavation methods, depending on the proximity to structures and mature trees. Shovels or other manual soil removal equipment may also be utilized by the

contractor if the excavation is located in an area inaccessible by other means. Hand excavation will be conducted at the base of mature trees located within designated excavation areas. Removal of constructed features (i.e. pools, fences) are described below; restoration of these features is addressed in Section 4.7. Soil erosion control measures will be implemented as needed to prevent migration of soils out of excavation areas. A water mist will be employed as necessary during excavation in order to control airborne migration of dust; the need for dust control will be determined in accordance with the HASP (see Section 9). To the extent possible, all excavated areas will be backfilled with clean fill soil at the end of each work day.

4.4.1 Excavation of Property B

Based on the existing data set, four removal action areas are proposed to be excavated. Two of these areas are proposed to be excavated to depths of 0.5 feet, one area is proposed to be excavated to a depth of 1.0 feet and one area is proposed to be excavated to a depth of 1.5 feet. As shown in Figure 4-1, additional areas of excavation have been designated at this Property. Based on the verification sampling strategy proposed in Section 3.2, 5 bottom samples and 20 sidewall samples will be collected on Property B. Supplemental verification samples will also be collected as described in Section 3.2. The proposed excavation areas and initial verification sampling locations are illustrated in Figure 4-1. The fence located east and south of the house will be removed prior to excavation.

4.4.2 Excavation of Property C

Based on the existing data set, five removal action areas are proposed to each be excavated to a depth of 0.5 feet. As shown in Figure 4-2, additional areas of excavation have been designated at this Property. Based on the verification sampling strategy proposed in Section 3.2, 6 bottom samples and 16 sidewall samples will be collected on Property C. Supplemental verification samples will also be collected as described in Section 3.2. The proposed excavation areas and initial verification sampling locations are illustrated in Figure 4-2. The fence located to the east of the house will be removed prior to excavation.

4.4.3 Excavation of Property E

Based on the existing data set, the entire Property is proposed for excavation and has been divided into two removal action areas. The removal action areas are proposed to be excavated to depths of 1.0 feet and 2.5 feet. As shown in Figure 4-3, additional areas of excavation have been designated at this Property. Based on the verification sampling

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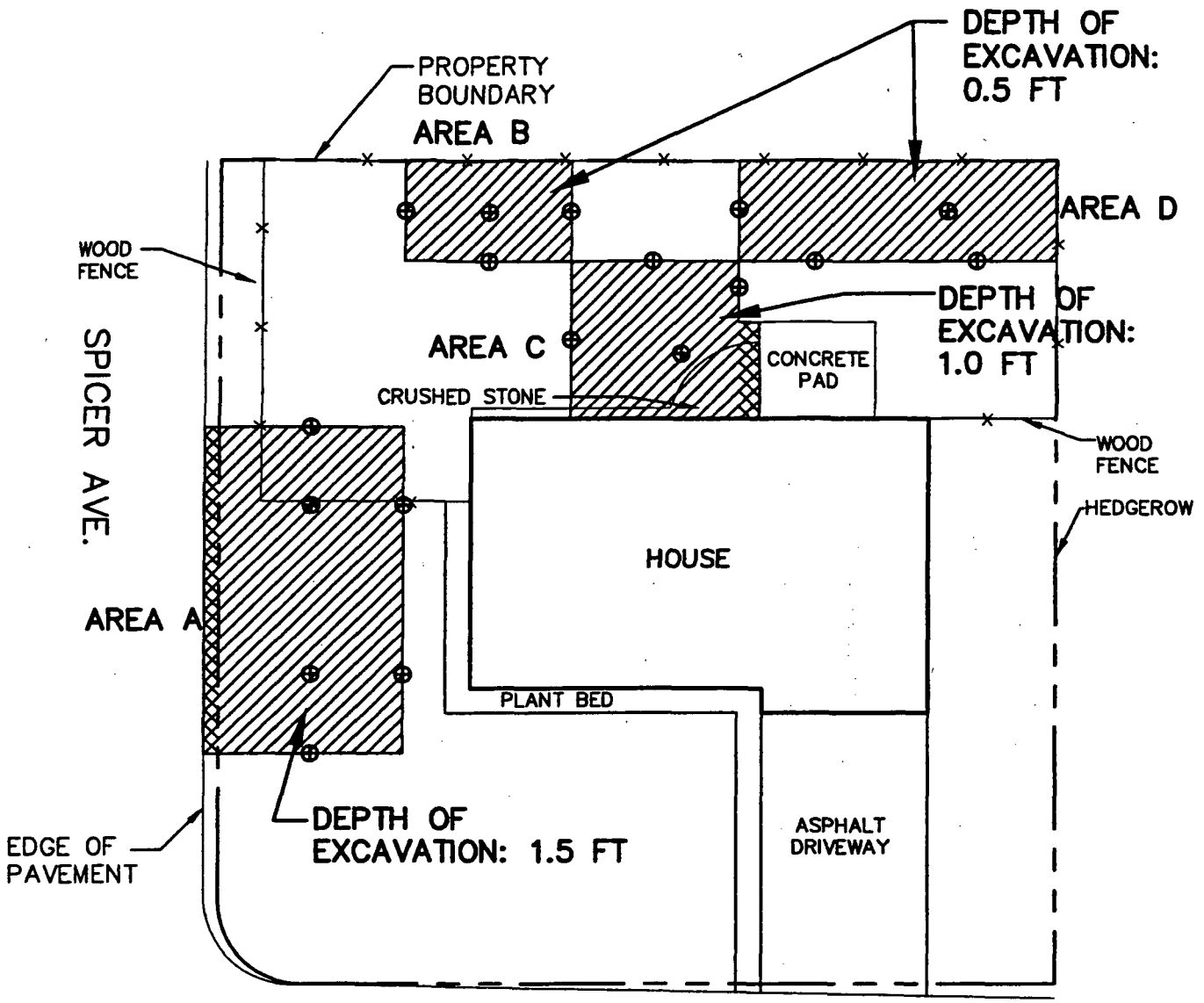

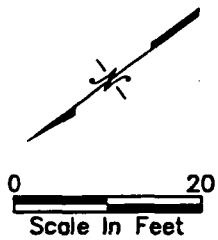

LEGEND

- PROPOSED EXCAVATION AREAS
- PROPOSED VERIFICATION SAMPLE LOCATIONS
- ADDITIONAL EXCAVATION AREA

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	PROPOSED SOIL EXCAVATION AREAS AT PROPERTY B 501 GARIBALDI AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4–1
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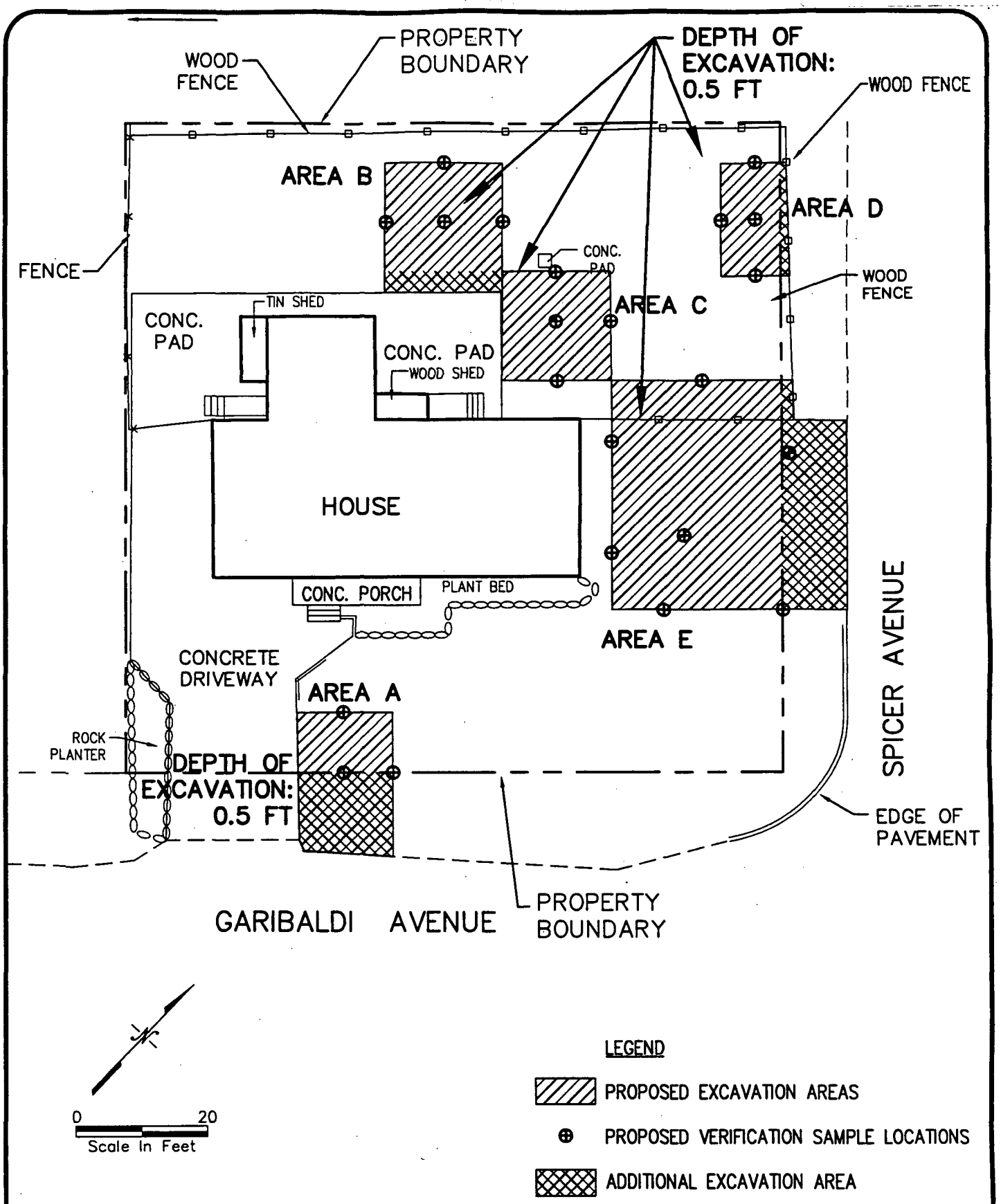
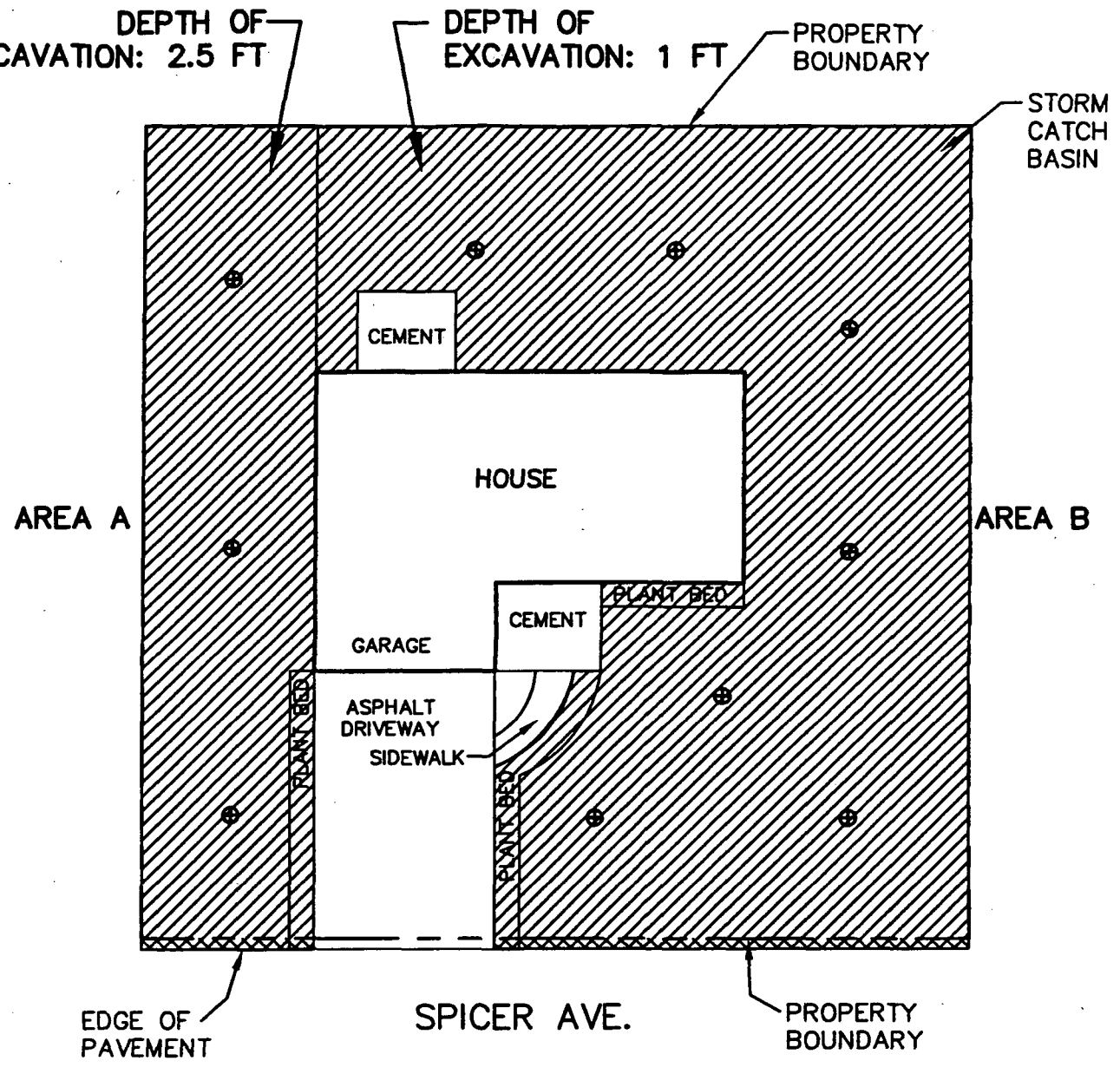
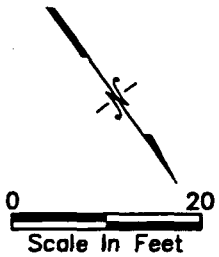


NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	PROPOSED SOIL EXCAVATION AREAS AT PROPERTY C 500 GARIBALDI AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4-2
DRAFTED BY: KPM/TJF | DATE: 9/25/98		5840AS58





LEGEND

- PROPOSED EXCAVATION AREAS
- ⊕ PROPOSED VERIFICATION SAMPLE LOCATIONS
- ADDITIONAL EXCAVATION AREA

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	PROPOSED SOIL EXCAVATION AREAS AT PROPERTY E 204 SPICER AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4-3
DRAFTED BY: KPM/TJF | DATE: 9/25/98		5840AS5C

strategy proposed in Section 3.2, 10 bottom samples will be collected on Property E. Supplemental verification samples will also be collected as described in Section 3.2. The proposed excavation areas and initial verification sampling locations are illustrated in Figure 4-3. During excavation, a silt fence/hay bay berm will be constructed around the storm water catch basin located in the southwest corner of the property. No fences or other constructed features on Property E are proposed for removal at this Property.

4.4.4 Excavation of Property F

Based on the existing data set, five removal action areas are proposed to be excavated. Three of these areas are proposed to be excavated to 1.0 feet, one area is to be excavated to a depth of 1.5 feet and one area is to be excavated to a depth of 2.5 feet. As shown in Figure 4-4, additional areas of excavation have been designated at this Property. Based on the verification sampling strategy proposed in Section 3.2, 5 bottom samples and 26 sidewall samples will be collected on Property F. Supplemental verification samples will also be collected as described in Section 3.2. Proposed excavation areas and initial verification sampling locations are illustrated in Figure 4-4. The pool and portions of the fence west and east of the house will be removed prior to excavation.

4.4.5 Excavation of Property I

Based on the sample data collected from the resampling conducted on September 3, 1998 (refer to Section 2.2), five removal action areas are proposed to be excavated. Four of these areas are proposed to be excavated to 1.0 feet. The remaining excavation area is to be excavated to a depth of 3.5 feet. As shown on Figure 4-5, additional areas of excavation have been designated at this Property. Based on the verification sampling strategy proposed in Section 3.2, 7 bottom samples and 32 sidewall samples will be collected on Property I. Supplemental verification samples will also be collected as described in Section 3.2. The proposed excavation areas and initial verification sampling locations are illustrated in Figure 4-5. The fence located west of the house will be removed prior to excavation.

4.4.6 Excavation of Property N

Based on the existing data set, four removal action areas are proposed to be excavated. Three of these areas are proposed to be excavated to 0.5 feet. The remaining excavation area is to be excavated to a depth of 1.0 feet. As shown on Figure 4-6, additional areas of excavation have been designated at this Property. Based on the verification sampling strategy proposed in Section 3.2, 4 bottom samples and 8 sidewall samples will be collected on Property N. Supplemental verification samples will also be collected as described in Section 3.2. The proposed excavation areas and initial verification sampling

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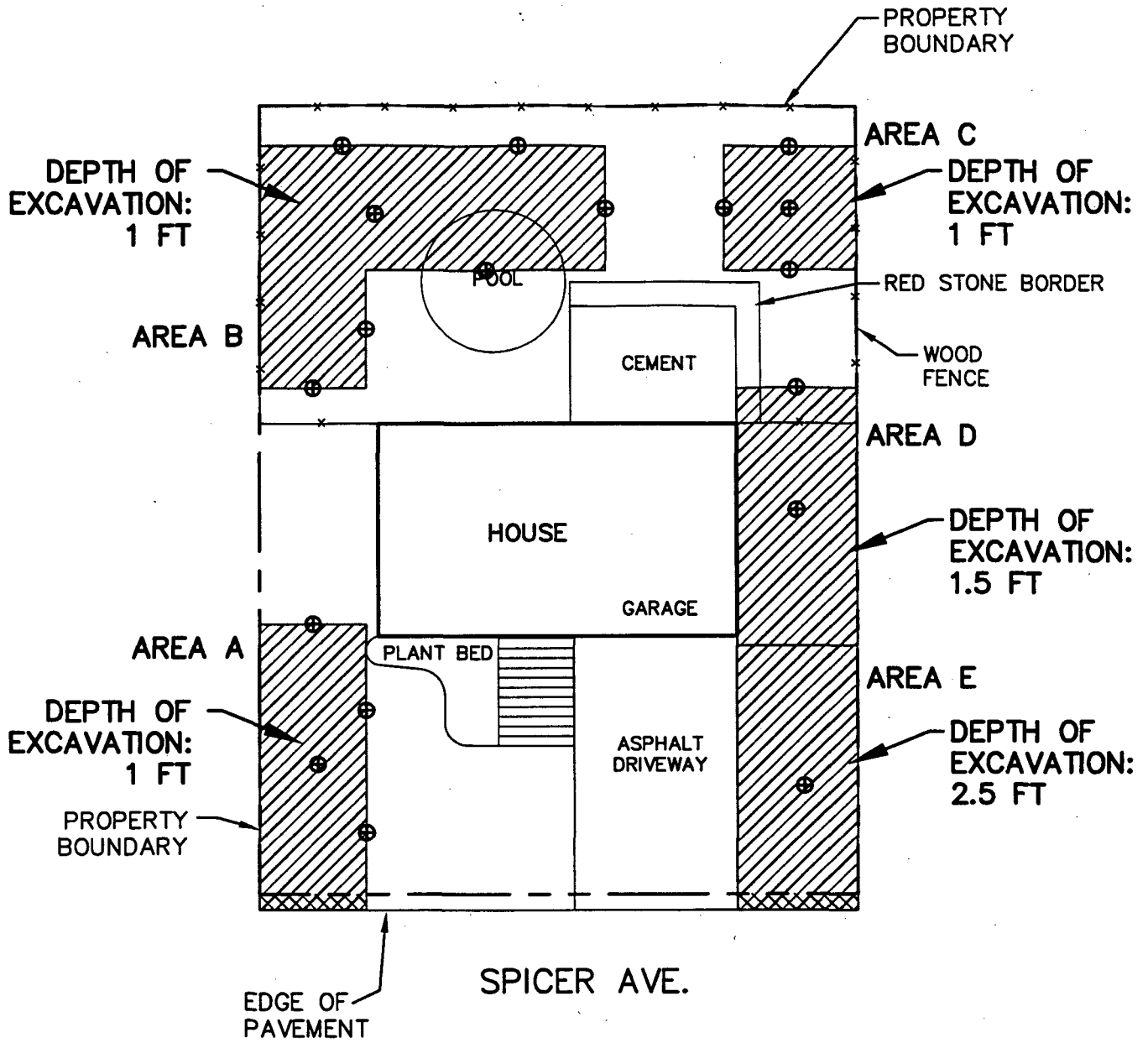

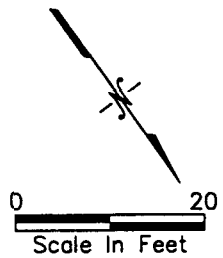

LEGEND

- PROPOSED EXCAVATION AREAS
- PROPOSED VERIFICATION SAMPLE LOCATIONS
- ADDITIONAL EXCAVATION AREA

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	PROPOSED SOIL EXCAVATION AREAS AT PROPERTY F 210 SPICER AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4-4
DRAFTED BY: KPM/TJF — DATE: 9/25/98		5840AS5D

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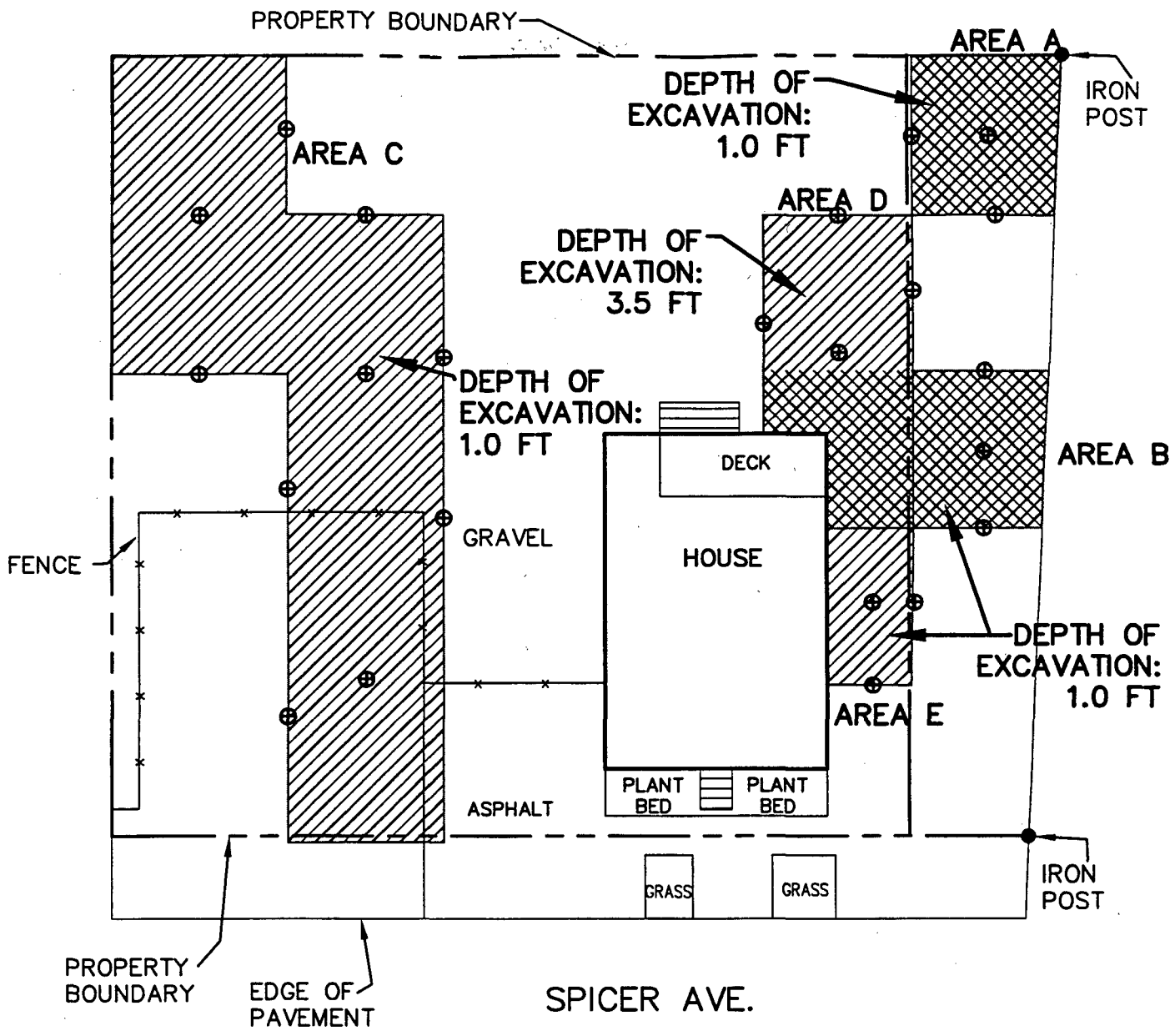

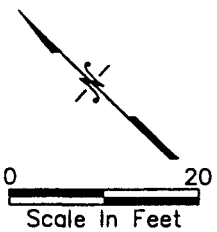

LEGEND

- PROPOSED EXCAVATION AREAS
- ⊕ PROPOSED VERIFICATION SAMPLE LOCATIONS
- ADDITIONAL EXCAVATION AREA

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	PROPOSED SOIL EXCAVATION AREAS AT PROPERTY I 305 SPICER AVE. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4-5
DRAFTED BY: KPM/TJF | DATE: 9/25/98		5840AS5E

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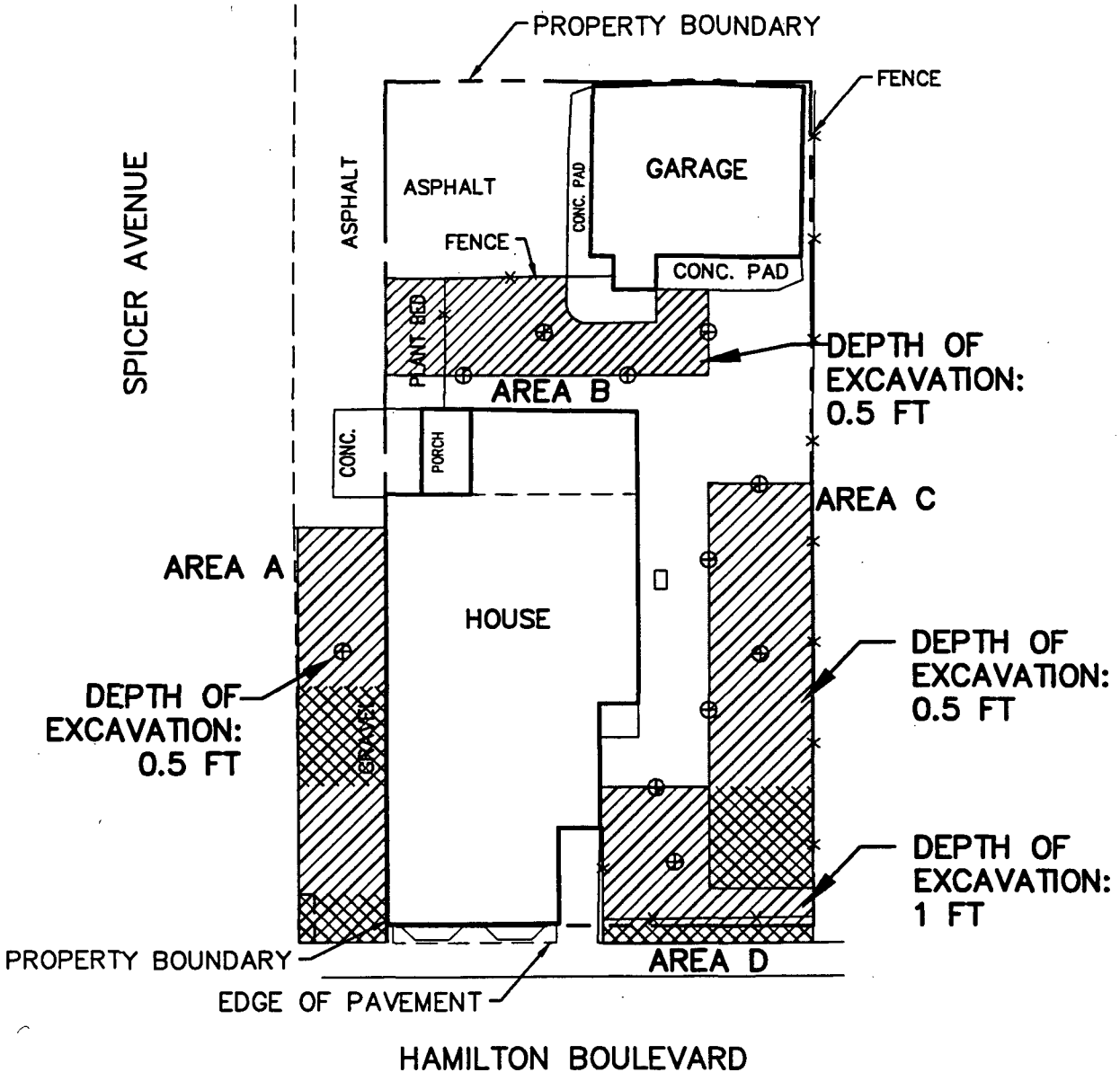

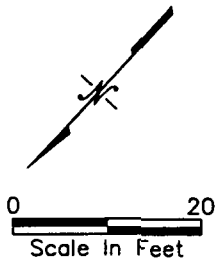

LEGEND

- PROPOSED EXCAVATION AREAS
- ⊕ PROPOSED VERIFICATION SAMPLE LOCATIONS
- ADDITIONAL EXCAVATION AREA

NOTE: DETAILS SUBJECT TO FIELD VERIFICATION

ENVIRON	SOIL SAMPLE LOCATIONS AT PROPERTY N 501 HAMILTON BLVD. SOUTH PLAINFIELD, NEW JERSEY	FIGURE 4-6
DRAFTED BY: KP./TJF | DATE: 9/18/98		5840AS5F

locations are illustrated in Figure 4-6. The fence located to the south of the house will be removed prior to excavation.

4.5 Soil Loading and Staging Procedures

Excavated soil is to be directly loaded into trucks from the excavation areas. Trucks awaiting receipt of excavated soil will be staged along Spicer Avenue. Trucks to be loaded will be parked on the street in front of the Property being excavated. Loaded excavation machines (i.e. backhoes) will utilize only the designated pathway in order to transport soil from the excavation area to the truck. Manually excavated soil will be transported along the same path using a wheelbarrow or other mobile transport mechanism.

In the event that direct loading cannot occur (e.g., the trucks are not available for loading during excavation or larger loaders are required to place soil into the dump trucks), the soil will be temporarily staged on the Hamilton Industrial Park site. A plastic liner will be placed on the ground to fully contain the temporary soil stockpile and any associated debris. This area will also be surrounded by silt fence to minimize runoff from the stockpile. If disposal transportation is not available by the end of the work day, a plastic tarp will be securely placed on top of the soil pile to prevent any erosion by the wind or rain.

4.6 Equipment Decontamination Procedures

Mechanized equipment (i.e. backhoes) will begin excavations from a clean area and will excavate linearly, so that the wheels of the machine do not contact PCB-containing soils within an excavation area. In order to prevent excavated soil from contacting clean soil outside the exclusion zone, plastic sheeting will be placed along the path of the excavating equipment. As soil spilled on the plastic may contact the wheels of mechanized equipment, the plastic will be periodically swept toward the exclusion zone and collected for transfer to the dump truck. During transport of excavated soil to the disposal truck, mechanized excavation equipment will be required to stop in the decontamination zone for visual inspection and removal of any accumulated dust or soil.

At the end of each work day, excavation machines and hand-held equipment may remain on-site at the discretion of the excavation contractor. Alternately, such equipment may be removed off-site or stored in the staging area described in Section 5. Any heavy equipment leaving the Property at the end of the work day must be decontaminated by steam cleaning in the decontamination zone. Wheels of excavation equipment must be visually inspected and any accumulated dust or soil will be removed for disposal. Wash water from the decontamination area will be collected for off-site management.

4.7 Property Restoration

Following completion of excavation activities each work day, the excavated areas will be backfilled with clean soil and graded to original condition. Fences will be reinstalled after site grading in the original locations as documented in Appendix B. The timing of complete restoration of landscaping and certain construction features (i.e. pools) will be dependent on the season and weather conditions. Landscape restoration will be to existing conditions or equivalent value; landscaping will be conducted by a landscaping contractor in accordance with the certified landscape architecture plan and planting schedule provided in Appendix B. Installation of the pool on Property F will be conducted after site grading at the discretion of the pool installation contractor; if weather conditions do not permit for proper installation of the pool, this activity will be rescheduled between the installation contractor and the Property owner.

5.0 SITE PREPARATION

5.1 Introduction

This section summarizes the activities that will be conducted on or in the vicinity of the Properties prior to implementation of the soil excavation action defined in Section 4.

5.2 Property Survey

A land survey will be conducted on each Property to verify the metes and bounds of each property. As part of this survey, the property corners will be identified with a wooden surveyor's stake or pin. An inventory will be taken of the existing vegetation and construction features on each Property and photographs will be taken so that the areas disturbed as a result of the removal action may be restored to pre-construction conditions or equivalent. The survey, inventory and photography activities will be conducted by a licensed survey/landscape architecture firm and will be completed prior to implementation of this Work Plan. Documentation resulting from these activities will be used in the development of a restoration schedule for each property. The existing conditions are documented on the restoration plans for each property provided in Appendix B.

5.3 Resident Relocation

The removal action activities on each Property will be scheduled to minimize disruption of residential activities. Relocation of residents on Property E is proposed and will be implemented as described below. Based on the smaller scope of excavation, shorter duration of remedial activity, and the dust control measures proposed in this Work Plan, no residential relocation is proposed for Properties B, C, F, I or N. Continuous air monitoring will be conducted at residential portals and dust control measures will be taken during remedial activities as described in Section 9. If a resident desires to voluntarily relocate during excavation activities on his or her property, relocation will also be implemented in accordance with the relocation procedures described below. Expenses for temporary relocation will be addressed through a per diem payment.

Relocation of residents at any Property will be implemented one day prior to preparation of work zones as described in Section 5.5. Residents may move to a temporary location of the residents' choosing; any pets must be relocated with the residents. Relocated residents may

not be permitted to enter their residences during implementation of the Work Plan. Relocated residents will be asked to provide the address and telephone number of their temporary location so that CDE and its contractors may communicate with the residents if necessary. Security will be provided as described in Section 5.4 for Properties in which the occupants have relocated. The above information will be provided in writing to residents that choose to relocate during implementation of the Work Plan.

5.4 Security

Prior to excavation activities, work zones will be defined as described in Section 5.5. All personnel entering the Property will sign an entry/exit log. Only authorized personnel meeting the requirements of the HASP will be allowed access to the Property. Entry onto the Property by other personnel will be at the discretion of the Project Coordinator and in accordance with the HASP. Exceptions to this policy will be documented by a signed waiver from individuals entering the Site. Access to the Property will be restricted by the Project Coordinator and the USEPA On-Scene Coordinator. A security firm will be contracted to conduct patrols during non-working hours at Properties for which residents have been requested to relocate, or appropriate security measures will be implemented.

5.5 Preparation of Work Site

5.5.1 Delineation of Work Zones

Initial work zones at each Property are proposed in Figure 5-1. ENVIRON will delineate exclusion zones, contamination reduction zones and clean zones in accordance with the HASP. Exclusion zones include all areas proposed for excavation and any clean areas located between excavation areas as designated in Figure 5-1. Contaminant reduction zones are buffer zones between the exclusion zones and the clean zones defined below. The contaminant reduction zones include, where feasible, clean areas on each Property surrounding the exclusion zones. Due to the limited work area at each Property and the proximity of each Property to other residences not included in this Work Plan, it will not be feasible to designate contaminant reduction zones around the complete perimeter of each exclusion zone. Clean zones are those areas not included in the scope of this Work Plan and include equipment storage areas and facilities described in Section 5.5. Decontamination zones are those areas on each Property designated for decontamination of remediation workers. Decontamination zones will be located on areas adjacent to each exclusion zone that have not been identified for soil removal action. The perimeters of these zones will be clearly marked on each Site, and entry to the various areas will be

THIS MAP IS AN OVERSIZED DOCUMENT. IT IS AVAILABLE FOR REVIEW AT:
U. S. EPA, REGION 2 SUPERFUND RECORDS CENTER
290 BROADWAY, 18TH FLOOR,
NEW YORK, NY 10007

5-1
FIGURE

PROPOSED INITIAL WORK ZONES

ENVIRON
214 CARNEGIE CENTER, PRINCETON, NJ 08540
ARLINGTON,VA • EMERYVILLE,CA • IRVINE,CA • NOVATO,CA • BUFFALO GROVE,IL
LOVELAND,OH • HOUSTON,TX • LONDON,UK • EDINBURGH,UK

RESIDENTIAL PROPERTY REMOVAL ACTION WORK PLAN SOUTH PLAINFIELD, NEW JERSEY

9/25/98	1"=40'	5040AB3A	11/6/98
DATE	SCALE	CADD FILE	PLOT DATE

G.REYNOLDS	KPM	M.NIELSEN
DESIGNED BY	DRAFTED BY	APPROVED BY

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controlled to limit access to authorized workers wearing the proper equipment. The perimeters of the work zones will be redesignated as soil removal activities progress. The HASP addresses the restrictions to access in each work zone and the required levels of protection.

5.5.2 Residence Preparation

Portals (e.g., windows, doors, vents, etc.) to each residence where excavation activities are to be conducted will be sealed with plastic sheets and tape during excavation in order to minimize the potential of dust from excavation activities entering the residence.

5.5.3 Utility Markout

Underground utilities on each Property will be identified prior to excavation by the contractor using the New Jersey One Call service and any additional resources required. No electricity is anticipated to be required during implementation of the Work Plan. Water will be transported to each Property each day as anticipated for decontamination activities and dust control. If a continuous water supply is required, contractors may install a flow gauge and connect to residential water lines. Contractors will record water usage so that appropriate compensation may be provided to the residents upon completion of Work Plan activities on each Property.

5.5.4 Staging and Storage Area

In the event that direct loading cannot occur (e.g., the trucks are not available for loading during excavation or larger loaders are required to place soil into the dump trucks), the soil will be temporarily staged on the Hamilton Industrial Park site. A plastic liner will be placed on the ground to fully contain the temporary soil stockpile and any associated debris. A silt fence will also be placed surrounding this staging area. If disposal transportation is not available by the end of the work day, a plastic tarp will be securely placed on top of the soil pile to prevent any erosion by the wind or rain. The temporary soil staging area is designated on Figure 5-1.

An equipment storage area is proposed on the Hamilton Industrial Park property as indicated in Figure 5-1. Vegetation will be cleared and a gravel cover will be placed on the cleared ground so that equipment may be stored without contacting exposed soil. Personal hygiene facilities (i.e. portable toilets and face washes) will be located in the equipment storage area. No trailers or temporary offices are proposed for implementation of this Work Plan; it is anticipated that daily support services can be provided by contractors from service vehicles as required. If temporary support facilities are required,

such facilities will be provided by the contractor and located on the Hamilton Park Industrial Park site.

5.5.5 Decontamination Areas

Prior to implementation of excavation activities, decontamination areas will be located adjacent to each exclusion zone as described above. Workers exiting the exclusion zone on foot must follow decontamination procedures as described in the HASP. Hand-held equipment must be decontaminated in accordance with decontamination procedures described in Section 3.4.3. Heavy equipment will be decontaminated in accordance with the procedures described in Section 4.6.

6.0 DISPOSAL PLAN

6.1 Scope of Removal Activities

Based on the results of the existing characterization sampling data, several areas at each of the six Properties were identified for excavation. The total quantity of soils to be excavated is estimated to be 1351 tons (901 cubic yards). The approximate quantities of soil to be excavated from each property are:

- Property B: 123 tons
- Property C: 60 tons
- Property E: 613 tons
- Property F: 184 tons
- Property I: 317 tons
- Property N: 49 tons

The maximum concentration of PCBs, as determined in characterization soil sampling, was 35 mg/kg. According to 40 CFR Subpart 761, soils with PCB levels less than 50 mg/kg may be disposed in a Subtitle D landfill if otherwise classified as nonhazardous. The excavated soil from the Properties is expected to be categorized as non-hazardous, non-TSCA waste. CDE anticipates using the G.R.O.W.S. Inc. Landfill in Morristown, Pennsylvania or the Clean Earth thermal treatment recycling facility in New Castle, Delaware. Additional information on these facilities and other facilities considered by CDE for this removal action is provided in Appendix C.

Transportation of PCB-containing soils will comply with applicable federal and state regulations. As the soil to be excavated is non-TSCA, non-hazardous waste, special placards are not required by DOT for placement on the waste transportation vehicles.

6.2 Disposal Requirements

Soil disposal activities must meet the requirements of both Middlesex County and the selected disposal facility. These requirements are described in the following subsections.

6.2.1 Middlesex County Requirements

The Middlesex County Utilities Authority (MCUA) has issued additional requirements for waste originating in Middlesex County and designated for disposal in a landfill, regardless of the location of the landfill. These requirements are as follows:

- A per ton fee must be paid to the MCUA.

- The waste must be weighed either at the Middlesex County Landfill (MCLF) or at the destination landfill. The latter choice is only available if the waste hauler is approved to self-weigh the waste.

- The hauling company must be registered with the MCLF. In addition each vehicle that will transport the waste must display a valid MCLF facility decal. These stipulations are required by the MCUA to identify that the waste originated in Middlesex County.

- If the waste is not being disposed at the MCLF, a monthly report must be submitted indicating the amount of waste disposed.

As confirmed through ENVIRON's discussion with the MCUA, these requirements do not apply if the soil is recycled.

6.2.2 Disposal Facility Requirements

ENVIRON has contacted each facility in order to identify the specific requirements for waste acceptance as described below.

- Maximum Allowable Chemical Concentration Limits

  The maximum PCB soil concentration accepted by each facility is as follows:

  -- G.R.O.W.S. Landfill: 50 mg/kg
  -- Clean Earth: 40 mg/kg

  The existing sampling data indicate that PCB concentrations at all of the Properties fall below the accepted limits of each facility under consideration.

- Waste Characterization
  The selected facilities will accept the existing data as sufficient for characterization; therefore, they do not require additional sampling. However, the Clean Earth facility requires supplementary sampling to be performed to further characterize the waste. The Clean Earth facility requires composite sampling of the soil to be excavated as a standard procedure for waste acceptance into the facility. Composite samples will be collected concurrently with the collection of the remedial verification samples. The samples will be collected and composited in accordance with the standard sampling procedures provided in Appendix A.1.

- Facility Forms
  Waste profiles and non-hazardous waste certification sheets are required by each of the facilities. These forms will be completed by CDE for the selected disposal facility.

- Transportation Permits
  The hauler requirements are specific to each state. Each hauler must have the appropriate permit for the state of the destination landfill or treatment facility.

6.3 Disposal Notifications

CDE provided USEPA with the list of off-site waste treatment and disposal facilities being considered for this removal action on September 4 and September 23, 1998. CDE will notify USEPA of the names and addresses of all off-site waste treatment, storage, or disposal facilities ultimately selected to receive soils from the Properties; this notification will be provided at least five (5) days prior to off-Site shipment of such wastes.

In addition, at least five (5) working days prior to out-of-state waste shipments, CDE will notify the environmental agency of the receiving state of the following: (a) the name and location of the facility to which the wastes are to be shipped; (b) the type and quantity of waste to be shipped; (c) the expected schedule for the waste shipments; (d) the method of transportation and name of transporter; and (e) treatment and/or disposal method of the waste streams.

In the event that any waste is destroyed pursuant to the AOC, certificates of destruction will be provided to USEPA upon CDE's receipt of such. These certificates will be included in the biweekly progress reports.

7.0 PERMITS, APPROVALS AND SITE ACCESS

7.1 Permits and Approvals

All activities required of CDE under the terms of the AOC will be performed only by qualified persons possessing all necessary permits, licenses, and other authorizations required by federal, state, and local governments, and all work conducted pursuant to the AOC will be performed in accordance with prevailing professional standards.

All hazardous substances, pollutants, or contaminants removed from the Properties pursuant to the AOC for off-Site treatment, storage, or disposal will be treated, stored, or disposed of in compliance with (a) Section 121(d)(3) of CERCLA, 42 U.S.C. §9621(d)(3), (b) Section 300.440 of the NCP, (c) RCRA, (d) the Toxic Substances Control Act ("TSCA"), 15 U.S.C. §2601, et seq., and (f) all other applicable federal and state requirements. However, as specified in the AOC pursuant to CERCLA and the NCP, no permit shall be required for any portion of the work that is conducted entirely on the Hamilton Industrial Park or at the Residential Properties.

If hazardous substances from the Properties are to be shipped outside of the State of New Jersey, CDE will provide prior notification of such out-of-state waste shipments in accordance with OSWER Directive 9330.2-07. CDE will assure that the receiving facility of any waste from the Properties possesses the appropriate environmental permits and/or approvals. Transportation of wastes off-site will comply with federal and state labeling, packaging and transportation requirements.

7.2 Property Access

CDE has obtained access agreements from the owners of each of the six Properties (Table 7-1) to conduct the work specified in the AOC. Copies of these agreements are provided in Appendix D. It is not anticipated during implementation of the Work Plan that soil removal actions will require short- or long-term use of adjoining residential private property owned by parties other than the Property owners, or that the soil removal action at each Property will include actions that might restrict access to or use of adjoining private residential property. Site access will be requested from the current owners of Hamilton Industrial Park for that portion of the property proposed for support activities as identified in this Work Plan. It is possible that access to public property (i.e. streets and/or sidewalks) may need to be restricted

TABLE 7-1 Resident Contact Information			
Property	**Resident**	**Address**	**Phone**
B	Lee and Cindy Walden Kane	501 Garibaldi Avenue	(908) 753-5772
C	Augusto Chavarriaga	500 Garibaldi Avenue	(908) 755-1336
E	Margaret Reidy	204 Spicer Avenue	(908) 757-9710
F	Diwan Puar	210 Spicer Avenue	(908) 754-4149
I	Frank Riccardi	305 Spicer Avenue	(908) 754-3785
N	Mark Calderone (owner, but not resident)	501 Hamilton Blvd.	(908) 668-4482

in order to implement portions of this Work Plan. CDE and its contractors will use best efforts to obtain access to any affected private or public property(s) prior to implementation of this Work Plan.

USEPA, NJDEP and their designated representatives, including, but not limited to, employees, agents, contractor(s) and consultant(s) thereof, will be permitted to observe the Work carried out pursuant to the AOC. CDE will at all times permit USEPA, NJDEP, and their designated representatives full access to and freedom of movement at the Properties and any other premises where Work under the AOC is to be performed for purposes of inspecting or observing CDE's progress in implementing the requirements of the AOC, verifying the information submitted to USEPA by CDE, conducting investigations relating to contamination at the Properties, or for any other purpose USEPA determines to be reasonably related to USEPA oversight of the implementation of the AOC.

8.0 QUALITY ASSURANCE PROJECT PLAN

8.1 Purpose

A QAPP has been prepared in accordance with the following guidance documents for all sample collection and analysis activities conducted pursuant to the AOC: USEPA SW-846; *Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring,* USEPA, May, 1984; *National Enforcement Investigations Center Policies and Procedures Manual*, May 1978, revised August, 1991; and the *National Enforcement Investigations Center Manual for the Evidence Audit*, September, 1981. The QAPP is provided as Appendix A to this work plan. The purpose of the QAPP is to summarize the standard procedures and methods for sample collection and analysis to be followed during implementation of removal action activities. This will ensure that the results are of sufficient quality and can be used to (1) reliably indicate the presence or absence of PCBs; and (2) reliably determine the extent of soil removal required in order to remediate the site in accordance with the criterion specified in the AOC.

Standard quality assurance/quality control (QA/QC) protocols will be followed during this sampling program to ensure that the results of this sampling are of sufficient quality and can be used to reliably indicate the presence or absence of constituents. QA/QC protocols to be utilized for this program are equivalent to those provided in the guidance documents described above. The evaluation of data will involve the collection of QC samples in accordance with the sampling and analysis protocols. The QA/QC protocols will also include the systematic validation of the analytical data and the management of the analytical data in electronic format. A description of the general QA/QC program to be implemented under this program is provided in Appendix A.2 with project-specific requirements discussed below. Standard sampling and sample management procedures, as described in Section 3, are addressed in Appendix A.1.

8.2 Removal Action Objectives and Data Usage

The purpose of this removal action is to characterize and remove designated PCB-containing soils on each Property as specified in this Work Plan. The scope of removal action activities is described in Section 4 of this Work Plan. The data collected from these activities will be used to assess the nature and extent of PCB-containing soils and to confirm delineation of soil

removal areas. Samples will be collected on each Property as required to support the removal action objectives indicated above. Sample collection parameters (i.e. frequency, quantity, type, location) and analytical specifications (i.e. analytical method, parameter table) for samples collected as part of this removal action are described in Sections 3 and 4.

8.3 Quality Control Field Samples

8.3.1 Contamination Control Samples (Equipment Rinsates and Trip Blanks)

Equipment rinsates are used to confirm that the sample bottle, sampling device, and the sampling procedure are not contaminating the sample. Contaminant-free water is transported to the sampling point, poured over or through the sample collection device, collected in a sample container, preserved, and returned to the laboratory for analysis. ENVIRON will collect one (1) field equipment rinsate blank each day of sampling from decontaminated sampling equipment. Rinsate blanks will be analyzed for all parameters for which the samples collected are analyzed.

A trip blank for volatile organic compounds (VOCs) analysis consists of a contaminant-free matrix in the appropriate sample container with preservative. This sample is generated by the container preparer, transported to the field (staying with the sample containers continually), and returned without being opened. The trip blank provides a measure of potential positive interferences introduced by sample preservation, transportation, storage, and analysis. Since analysis for VOCs is not part of this sampling program, trip blanks will not be required.

8.3.2 Precision Control Samples (Field Duplicate Samples)

Analysis of duplicate samples provides information concerning the precision of the sampling and analytical processes. Two samples are taken in the field at the same location so that they represent the sample matrix as closely as possible. The results obtained from the measurement of field duplicate samples reflect the total precision of the sampling and analytical procedures and the variability in obtaining samples that are intended to represent one sampling point. ENVIRON will collect one field duplicate sample for every 20 soil samples collected. Duplicate samples will be analyzed for all parameters for which the corresponding sample pairs are analyzed.

8.4 Quality Control Laboratory Samples

8.4.1 Contamination Control Samples (Method Blanks)

For each batch of samples processed, method blanks (using ASTM Type I to IV water and reagents) are carried throughout the sample preparation and analytical processes. These blanks are used to assess whether samples are being contaminated in the laboratory. Method blanks are specific for each analytical method and for each batch of 20 or fewer samples.

8.4.2 Accuracy and Precision Control Samples (Matrix Spike Samples)

A matrix spike and a matrix spike duplicate sample are created when the analyst adds a known amount of an analyte of interest into a portion of an environmental sample. The data from a matrix spike provide information on the matrix effects of a particular sample. ENVIRON will collect one matrix spike sample and duplicate for every 20 soil samples collected. Matrix spike samples will be analyzed for all parameters for which the corresponding sample pairs are analyzed for.

8.5 Data Validation and Usability Review

ENVIRON will subject all analytical data to data validation and review of usability, including an evaluation of data quality parameters, false negatives, and detection limits. The primary purpose of the validation and review will be to determine if any qualitative and quantitative problems are evident from the laboratory QA/QC data, not to verify whether the laboratory-reported QA/QC information is correct. Specific performance criteria to be used for this review will follow the procedures specified in Appendix A.2.

In addition to the general validation process described in Appendix A.2, all analytical data will be subject to data validation using criteria set forth in *USEPA Region II Standard Operating Procedures HW-23 Revision 0* appropriate for PCB-only analyses. The primary purpose of this review is to determine if any quantitative problems are evident from the laboratory QA/QC data, not to verify whether the laboratory reported QA/QC information is correct. Specific performance criteria to be used for this review will follow the respective analytical method.

8.6 Data Management

All analytical data generated during this investigation will be formatted into a usable medium, such as a computer data base program. The data base will contain the analytical results received from the laboratory such as the sample identifier, the analytical parameter, the reported result and any necessary qualifier, the method detection limit and any qualifier

associated with it, and the measurement units. It will also contain additional information on the sampling date, the sample medium, the sampling method, and the types of analyses to be performed on the sample. This data base will allow the generation of summary tables, graphs, and figures. It will also maintain the integrity and accountability of the original data. A copy of ENVIRON's electronic data deliverable format specifications is provided in Appendix A.2.

8.7 Approach to QAPP Implementation

This section provides the approach taken by the project team to meet regulatory and client requirements. It outlines and provides details of the requirements for (1) organizational structure, functional responsibilities, levels of authority, and lines of communication; (2) training of personnel responsible for performance of work activities affecting quality; and (3) procurement requirements.

8.7.1 Organization and Responsibilities

The organizational structure of the project team, functional responsibilities, levels of authority, and lines of communication are described below. The individuals comprising the project team will be identified for removal action activities by CDE and ENVIRON.

Project Coordinator

The project coordinator reports to CDE and will serve as project director and overall technical reviewer of project deliverables. The project coordinator's responsibilities include review of work plans, schedules, costs, technical performance, and coordination of project activities with the project manager to achieve the objectives of the removal action and communication with both CDE personnel and relevant regulatory agencies.

Project Managers

Project managers report to the program coordinator and will be responsible for certain portions of the Work Plan activities, such as the organization, coordination, and supervision of various project activities and the associated field work. Their responsibilities include communications with CDE and regulatory agency personnel, supervision of subcontractors, participation in report preparation and technical review, and tracking of schedules and budgets. Each project manager is responsible for ensuring conformance with standard operating procedures, including the overall quality of field and office activities. Project managers will oversee all aspects of project data collection and reporting, and development of this Work Plan, including

data collection and reporting requirements that are consistent with the requirements specified in the AOC.

Field Staff

Field staff report directly to the project managers and are responsible for assisting the project managers with the organization, coordination, and supervision of the various field tasks, including oversight of subcontractors.

Project Quality Assurance Manager

The project quality assurance manager reports directly to the project managers and is responsible for implementing the QAPP and addressing all matters relating to the Quality Assurance/Quality Control (QA/QC) needs of the removal action. In addition, the project quality assurance manager conducts audits to ensure that work activities comply with this QAPP.

Site Health and Safety Officer

The site health and safety officer reports directly to the project managers and is responsible for implementing the HASP.

Field Subcontractors

Field subcontractors report to the project managers and will consist primarily of surveyors, waste management and construction contractors. Field subcontractors are responsible for documentation of initial Property conditions, excavation and construction activities and restoration of each Property to initial conditions.

Laboratory

The laboratory reports directly to the project quality assurance manager and will be responsible for implementation of appropriate sections of the QAPP and achieving the data quality objectives for analytical work in this investigation.

The organization structure and the responsibility assignments are such that quality is achieved and maintained by those who have been assigned responsibility for performing work, and quality achievement is audited and verified by persons or organizations not directly responsible for performing the work. The organizational responsibilities reflect an integration of the technical, administrative, quality control, and quality assurance functions such that the QA program elements are disseminated throughout the entire organizational structure and are an integral part of daily operations. In situations where

organizations such as subcontractors, suppliers, consultants and laboratories are involved in the execution of activities governed by the requirements of this QAPP, the responsibility and authority of such organizations will be clearly established and documented.

8.7.2 Training

Field staff and office personnel performing quality control activities will be trained on the following:

- Objectives of the project;
- The contents of this QAPP;
- The procedures described in this Work Plan;
- Individual job responsibilities and authority.

8.7.3 Procurement Requirements

Procurement of equipment and services will be made in accordance with project standards outlined in the Work Plan, QAPP and HASP to assure that each prospective supplier or subcontractor understands the requirements. Applicable regulatory requirements and other requirements that may be necessary to ensure adequate quality will be included or referenced in the documents for procurement of material, equipment and services.

9.0 HEALTH AND SAFETY PLAN (HASP)

ATC Associates has prepared a site-specific HASP for ENVIRON to provide job safety and security in compliance with 29 CFR 1910.120; a copy of the HASP is provided as Appendix E. Specific elements to be addressed in this HASP include:

- General information including site name, address, contact, background, work objectives, names of personnel who will be on-site, and names of key personnel responsible for site safety;
- Potential physical, chemical, and biological hazards;
- A brief hazard evaluation;
- Descriptions of appropriate levels of personal protection and decontamination;
- Air Monitoring Plan and dust control measures; and
- Emergency services information.

All ENVIRON personnel who will be conducting sampling and removal action oversight activities at the site under this program will be required to read and sign the HASP. All contractors performing work pursuant to this Work Plan will be required to prepare a HASP that meets the minimum requirements set forth in the HASP provided in Appendix E.

If performance of any subsequent phase of the work required by the AOC requires alteration of the HASP, CDE will submit to USEPA for review and approval proposed amendments to the HASP.

10.0 COMMUNITY RELATIONS

CDE will cooperate with USEPA in providing information to the public relating to the work required by the AOC. As requested by USEPA, CDE will participate in the preparation of all appropriate information disseminated to the public; participate in public meetings which may be held or sponsored by USEPA to explain activities at the Properties; and provide a suitable location for public meetings, as needed.

All documents submitted to USEPA in the course of implementing the AOC will be available to the public unless identified as confidential by CDE pursuant to 40 CFR Part 2, Subpart B, and determined by USEPA to merit treatment as confidential business information in accordance with applicable law. In addition, USEPA may release all such documents to NJDEP, and NJDEP may make those documents available to the public unless CDE conforms with applicable state law and regulations regarding confidentiality. CDE will not assert a claim of confidentiality regarding any monitoring or hydrogeologic data, any information specified under Section 104(e)(7)(F) of CERCLA, or any other chemical, scientific or engineering data relating to the Work performed hereunder.

A copy of the removal action schedule and an information sheet will be distributed to each residence prior to implementation of this Work Plan. The information sheet will provide the following information:

- Identify the project manager, contractors, subcontractors and other personnel (e.g. USEPA representatives) authorized to access restricted work areas;
- Describe site preparation procedures to be taken on each property prior to excavation and restoration work;
- Describe the excavation and restoration procedures;
- Identify potential hazards and describe security measures to mitigate these hazards;
- Describe the proposed restoration plan.

11.0 WORK PLAN IMPLEMENTATION

11.1 Project Schedule

A schedule has been developed for implementation of the activities described in this Work Plan in accordance with the requirements of the AOC. The proposed project schedule is provided in Figure 11-1; this schedule will be refined based on input from the selected remediation contractor (see Section 11.2).

11.2 Coordination of Contractors

11.2.1 Contract Documents

Following submittal of this Work Plan to USEPA, removal action bid documents will be prepared for the implementation of the activities defined in this plan. These bid documents will include all drawings and specifications necessary to solicit bids for implementing the work. In addition, these documents will establish contractor performance standards for removal action to ensure achievement of cleanup goals.

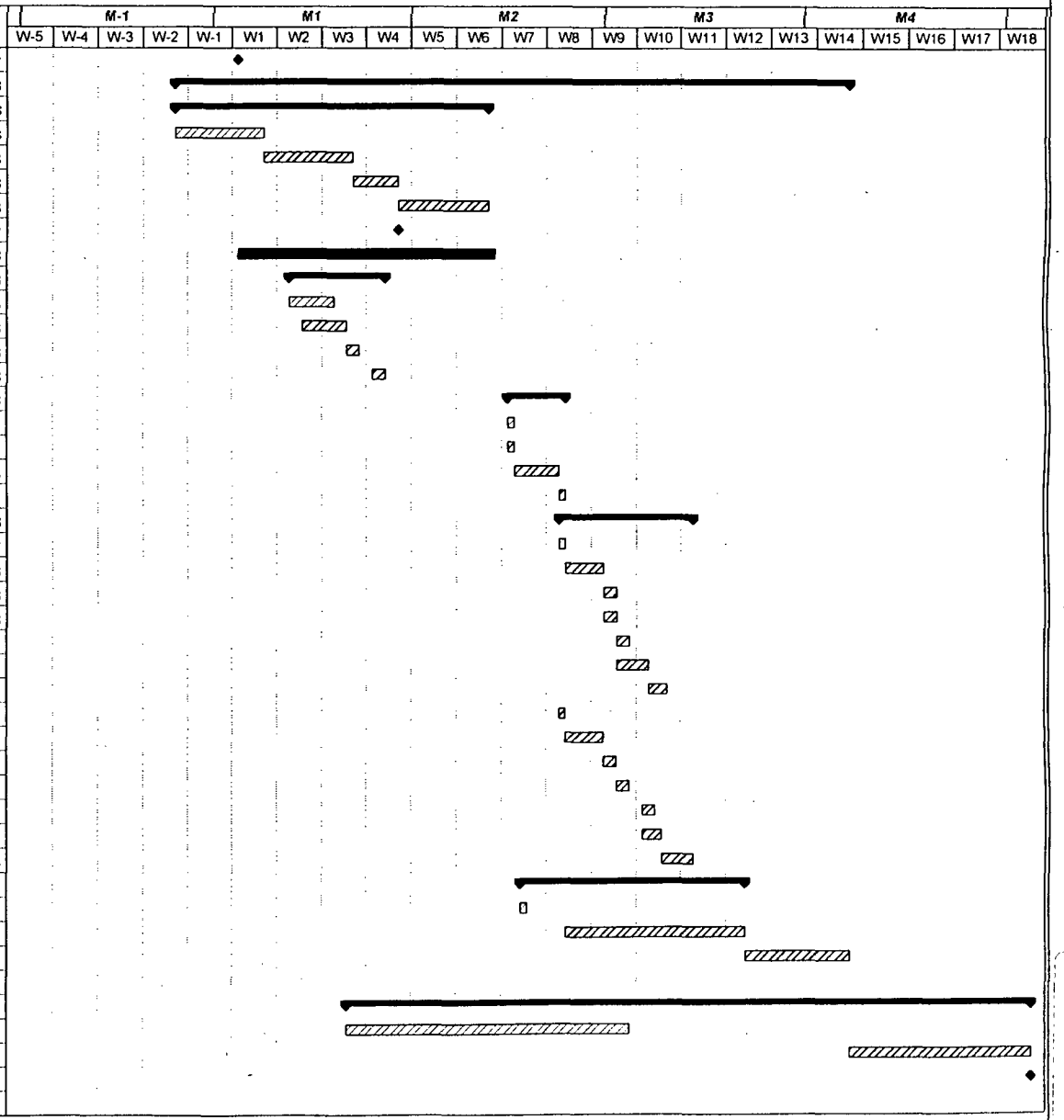
11.2.2 Contractor Selection

CDE will identify potential contractors and solicit proposals to implement the Work Plan. Based on the evaluation of bids, CDE will select contractors and notify USEPA of this selection in accordance with the requirements of the AOC; CDE will also notify USEPA of the name and qualifications of any contractor or subcontractor proposed to perform work under the AOC at least ten (10) days prior to commencement of such work.

A copy of the AOC will be provided to each contractor and subcontractor approved and retained to perform the work required by the AOC. All contracts or subcontracts entered into for work required under the AOC will include provisions stating that such contractors or subcontractors, including their agents and employees, shall perform activities required by such contracts or subcontracts in compliance with the AOC and all applicable laws and regulations.

FIGURE 11-1
Removal Action Implementation Schedule

Task Name	Work Days
RECEIVE APPROVAL OF WORK PLAN	**1 day**
WORK PLAN IMPLEMENTATION	**66 days**
Contracting	**35 days**
Prepare and issue RFP	10 days
Contractor Bid Preparation	10 days
Contractor Selection	5 days
Contracting	10 days
Notify USEPA of Contractor Selection & Provide Insurance	1 day
Obtain Permits/Approvals	**30 days**
Verification Sampling	**11 days**
Sampling collection	5 days
Laboratory Analysis	5 days
Statistical Analysis (draft data)	2 days
Final delineation of Excavation Areas	2 days
Mobilization	**7 days**
Initiate field activities	1 day
Utility notifications	1 day
Set up work zones/security	5 days
Contractor briefing	1 day
Soil Excavation & Initial Restoration	**13 days**
Property B, E and F setup	1 day
Property B Excavation	2 days
Property B Restoration	2 days
Property F Excavation	2 days
Property F Restoration	2 days
Property E Excavation	3 days
Property E Restoration	3 days
Property C, N and I setup	1 day
Property C Excavation	2 days
Property C Restoration	2 days
Property N Excavation	2 days
Property N Restoration	2 days
Property I Excavation	3 days
Property I Restoration	3 days
Waste Soil Disposal	**23 days**
Notification to EPA & receiving state of planned waste shipments	1 day
Waste soil loading and off-site disposal	18 days
Demobilization	5 days
REPORTING	**67 days**
Laboratory Reporting & Validation	30 days
Report Preparation	20 days
Submittal of Final Report to EPA	



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11.2.3 Contractor Health and Safety Plan

The HASP developed by the excavation contractor will meet the minimum requirements set forth in the HASP provided in Appendix E. The contractor's HASP will be available on-site at all times during implementation of this Work Plan.

11.3 Reporting

11.3.1 Progress Reporting

During the implementation of the AOC, written progress reports will be provided to USEPA every two (2) weeks which fully describe all actions and activities undertaken pursuant to the AOC. Such progress reports will (a) describe the actions taken toward achieving compliance with the AOC during the previous two-week period; (b) include all results of sampling and tests and all other data received during that period in the implementation of the Work required hereunder; (c) describe all actions which are scheduled for the next two-week period; (d) provide other information relating to the progress of work as is customary in the industry; and (e) include information regarding percentage of completion, all delays encountered or anticipated that may affect the future schedule for completion of the Work required hereunder, and a description of all efforts made to mitigate those delays or anticipated delays.

The biweekly progress reports will also include a schedule for the field activities which are expected to occur pursuant to the AOC during the upcoming month. In addition, these reports will provide USEPA with at least one week advance notice of any change in that schedule.

11.3.2 Final Reporting

Within thirty (30) days after completion of all activities required under the AOC and the receipt of all validated sampling results, CDE will submit for USEPA review and approval a Final Report summarizing the actions taken to comply with the AOC. The Final Report will conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP, entitled "OSC Reports." The Final Report will include:

a. a synopsis of all Work performed under the AOC;

b. a detailed description of all USEPA-approved modifications to the Work Plan which occurred during the performance of the Work required under the AOC;

c. a listing of quantities and types of materials removed from the Properties or handled at the Properties;

d. a discussion of removal and disposal options considered for those materials;

e. a listing of the ultimate destination of those materials;

f. a presentation of the analytical results of all sampling and analyses performed, including QA/QC data and chain of custody records;

g. accompanying appendices containing all relevant documentation generated during the work (e.g., manifests, invoices, bills, contracts, and permits);

h. an accounting of expenses incurred at the Properties;

i. the following certification signed by a person who supervised or directed the preparation of the Final Report:

I certify that the information contained in and accompanying this certification is true, accurate, and complete.

11.4 Record Keeping

Upon request, CDE will provide USEPA with access to all records and documentation related to the conditions at the Properties, hazardous substances found at or released at the Properties, and the actions conducted pursuant to the AOC except for those items, if any, subject to the attorney-client or work product privilege. Nothing herein will preclude CDE from asserting a business confidentiality claim pursuant to 40 C.F.R. Part 2, Subpart B. All data, information and records created, maintained, or received by CDE or their contractor(s) or consultant(s) in connection with implementation of the Work under the AOC, including, but not limited to, contractual documents, invoices, receipts, work orders and disposal records will, without delay, be made available to USEPA upon request, subject to the same privileges specified above in this paragraph. USEPA will be permitted to copy all such documents. CDE will submit to USEPA upon receipt the results of all sampling or tests and all other technical data generated by CDE or their contractor(s), or on CDE's behalf, in connection with the implementation of the AOC.

APPENDIX A

Quality Assurance Project Plan (QAPP) Procedures

APPENDIX A.1

Standard Sampling Procedures

APPENDIX A.1

Standard Sampling Procedures

ATTACHMENT

1.0 INTRODUCTION

This document outlines standard methodologies and protocols employed by ENVIRON personnel when conducting an environmental sampling program and is intended to supplement sampling program information described in site-specific Work Plans. Included in this document are descriptions of techniques for sampling the media identified in the site-specific Work Plan; decontamination procedures; and sampling documentation procedures. This manual is designed to cover the commonly used sampling techniques. Other sampling procedures may be used depending on site-specific field conditions. These special techniques will be described in detail in Work Plans relating to the specific field sampling program. Depending on the regulatory program under which the sampling is being performed, additional sampling guidance and/or requirements should be consulted.

2.0 SAMPLING PROCEDURES

2.1 General Procedures

The following general procedures will be followed during all field sampling activities:

- The samples must be representative of the medium being sampled.
- Samples must be collected in the appropriate containers as specified by the selected analytical methodology. The sample containers must be properly cleaned to ensure that sample contamination does not occur. Only new containers prepared in accordance with USEPA container cleaning procedures will be used in the field sampling program. It is recommended that certified cleaned containers with batch QA/QC results be purchased. Used sample containers will not be cleaned and reused in this program.
- QC samples will be assigned in the field.
- The required preservatives and storage procedures must be used to minimize the loss of the analyte(s) of interest due to absorption, chemical or biological degradation, and/or volatilization.
- The appropriate volumes must be collected to ensure that the required detection limits can be met and quality control samples can be analyzed. The analytical laboratory should be contacted to determine their required sample volume. Liquid containers for VOC analysis should be overfilled, closed and sealed; if air bubbles appear when the sample vial is inverted and tapped, then the sample should be discarded and the container refilled until no bubbles are observed.
- Following collection, the samples must be properly labeled and shipped to the laboratory in a manner to ensure samples are kept at the appropriate temperature and that the holding times for the analysis can be met.

- Sample chain-of-custody procedures will be followed and are described in Section 3.3, Sample Custody.

- All sampling equipment used for more than one location will be properly decontaminated between locations.

- Sampling equipment will be placed on clean plastic sheets in the sampling area.

- Equipment requiring fuel will be refueled in an area that is a significant distance from any sampling points and the fuel will be stored away from the sampling and container storage areas to prevent volatile organic compound (VOC) contamination.

2.2 Definitions

- Discrete (Grab) Sample - An individual sample collected from a single location.

- Composite Sample - A series of grab samples that are combined to form a single sample. Each grab sample is collected in an identical manner. Equal amounts from each grab sample are used to form the composite.

- Duplicate (Replicate) Sample - Two or more samples collected simultaneously from the same source under identical conditions.

2.3 Composite Samples

Composite samples may be used to reduce the analytical time and expense. The strategies for forming composite samples include:

- Composite only samples of the same matrix (all soil or all water).

- To the maximum extent possible, composite adjacent samples within the same area of investigation.

- To the extent possible, form composites with equal numbers of samples.

2.4 Stream Sediment Sampling Procedures

Because many contaminants preferentially adsorb onto fine particles, maximum contaminant concentrations are often found in the finest-grained regions of heterogeneous sediment deposits. To collect a sediment sample from a streambed, a variety of methods can be used. Dredging (Peterson, Eckman, Ponar), coring, and scooping (BMH-60) are available. Regardless of the method used, precautions shall be taken to insure that the sample collected is representative of the streambed.

- For routine analyses, the dredge can be used when the bottom is rocky, in very deep water, or when the stream velocity is high. The dredge should be lowered very slowly as it approaches bottom, because it can displace and miss lighter materials if allowed to drop freely.

- Core samplers are used to sample vertical columns of sediment. They are particularly useful when a historical approach to sediment deposition is desired for they preserve the sequential layering of the deposit.

- If the water is wadeable, the easiest way to collect a sediment sample is to scoop the sediment using a stainless steel spoon or scoop. This reduces the potential for cross-contamination. This can be accomplished by wading into the stream, and while facing upstream (into the current), scooping the sample along the stream bottom in the upstream direction. If the stream is too deep to wade but less than eight feet deep, a stainless steel scoop attached to a piece of conduit can be used either from the banks if stream is narrow or from a boat.

Regardless of the method of collection, sediment samples collected for chemical analysis should be thoroughly mixed before being placed in the appropriate sample containers. When sampling sediment from beneath a flowing body of water, downstream locations are sampled first so that subsequent samples will not be affected by disturbances that result from sampling. Caution should be exercised not to disturb the area to be sampled when the sample is obtained by wading into shallow water. If the sampling device must be inserted into the sediment repeatedly to obtain an adequate sample volume, the material will be thoroughly mixed prior to filling sample jars (see Section 2.5.3). Before collecting a sample for chemical analysis, all sampling equipment must be decontaminated using the procedures described in Section 2.0.

Sampling depths and physical description of the sample, along with any other pertinent observations (e.g., unusual discoloration) will be recorded in field notes. During sampling, a

physical description of the stream (e.g. width, depth and flow rate) at the sampling location will also be recorded in the field notes.

2.5 Soil Sampling Procedures

The methods and equipment used for soil sampling depend on the sample depth, type of sample, and type of soil. All sampling equipment that comes in contact with the soil must be decontaminated prior to reuse following the procedures described in Section 2.0. Unless otherwise specified in the Work Plan all soil samples will be homogenized prior to placement in laboratory-supplied sample jars to ensure laboratory results are representative of the entire interval sampled. All sample locations will be marked with a surveyors stake or flag for future reference.

Soil sampling depths and physical description of the sample, along with any other pertinent observations (e.g., unusual discoloration) will be recorded in field notes. During drilling of deep borings, a geologic log, including a physical description of soils encountered, depths of lithologic changes, and the depths and identification numbers of the samples collected for chemical analysis, will be recorded in the field notes.

2.5.1 Surface Soils

Surface soil samples will generally be collected from ground surface to a maximum of 24 inches below ground surface. These samples can be collected using hand equipment such as spoons, shovels, trowels, push-tubes, and/or post-hole diggers constructed of steel or stainless steel. Surface samples may also be collected in conjunction with the use of heavy equipment.

If a sample cannot be collected at the designated location, an adjacent location will be selected. The new location and reason for changing will be documented in the field notes. If a thick, matted, root zone is encountered at the surface, it will be removed prior to sampling. Other foreign objects will be removed prior to sampling.

Unless otherwise required, the soil sample will be placed in a stainless steel bowl or pan and thoroughly mixed prior to placing in the sample container. Large stones, twigs, debris, and other foreign organic matter will be discarded from the sample prior to mixing. Section 2.5.3 contains recommended procedures for mixing soil samples.

2.5.2 Subsurface Soils

Subsurface soil samples will generally be collected below 24 inches below ground surface, one sample at a time, using a new sampling device each time. Subsurface soil sampling may require a hand auger, a trowel, a split spoon, direct push sampler (e.g., Geoprobe) and/or a backhoe. If a vertical composite sample is required over the sampling interval,

the same sampling device may be used to collect the samples. If discrete grab samples are required, the sampling device must be decontaminated between samples. The top few inches of the soil should be removed from the sampling device to minimize cross contamination due to "fall-in" of material from the upper portions of the hole.

2.5.3 Soil Sample Mixing

The soil sample will be placed in a stainless steel bowl or pan and thoroughly mixed prior to placement in the sample container. Large stones, twigs, debris, and other foreign organic matter will be discarded from the sample prior to mixing. Soil samples should be mixed as thoroughly as possible to ensure that the sample is representative of the sample interval. A common method of mixing is "quartering." The sample is placed in the sample pan or bowl and divided into quarters. Each quarter is thoroughly mixed and all quarters are mixed together. This procedure is repeated several times until the sample is thoroughly mixed. If a round bowl is used, the sample can mixed by stirring in a circular manner and occasionally turning the material over.

2.6 Ground Water Sampling Procedures

Ground water samples will be collected using either peristaltic pumps or stainless steel or Teflon bailers. Prior to collecting samples, clean plastic sheeting should be placed on the ground to provide a clean work area. All sampling equipment that comes in contact with the ground water must be decontaminated prior to reuse following the procedures described in Section 2.0. Pumps used for purging the well prior to sampling should not be used for sampling. If required, samples for VOC analyses will be collected first using a bailer with minimum agitation. Samples for metals analysis will be filtered using 0.45-micron dedicated field filters; samples for organic compound analyses will not be filtered.

Prior to sampling, the monitoring wells will be purged of three to five times the volume of standing water in the well and until the specific conductance, temperature, and pH of the ground water are stabilized before sampling. Depth to water measurements from the top of the well casing will be made prior to purging to determine the existing well volume. Wells can be purged by using in-place plumbing/pumps or peristaltic, turbine, bladder, centrifugal, or other appropriate pump. A Teflon or stainless steel bailer may also be used. If possible, wells should not be pumped dry during purging; however, if a well is pumped dry before removing the specified volume of water, the well can be sampled following recovery. Purge water will be collected for proper disposal.

Prior to purging and sampling, the depth to water and total well depth will be measured, and the physical condition of the well will be inspected and recorded on the field sampling data log (see Attachment A.1-1). The specific conductance, temperature and pH measurements,

and any physical characteristics of the ground water (e.g., color, sheen, odor, turbidity) observed at the time of purging and sampling, and the purge rate, if applicable, will also be recorded in the field log.

2.7 Sample Designation

Field sampling personnel are responsible for the description, documentation, labeling, packaging, storage, handling, and shipping of samples obtained in the field so that all samples can be readily identified. These practices are necessary to ensure the integrity of the sample from collection through laboratory analysis and data reporting.

2.7.1 Sample Labels

Sample labels and tracking via Chain-of-Custody forms are of critical importance in the collection of samples. Field personnel will attach a sample label with a unique sample identification to each sample container either before or immediately after filling each container. The sample labels will be placed on the sample containers so as not to obscure markings on the containers; sample information must be printed legibly using waterproof ink. The label must contain sufficient information so that the sample can be identified on the sampling information form or sample collection log. All data for a sample are keyed to its unique sample designation. This sample designation on all sample containers and associated field data forms is utilized for data recall from the data base system. Additional information on sample custody and the Chain-of-Custody forms is provided below.

2.7.2 Sample Identification

The sample numbering scheme described below has been developed to standardize data that will be entered into the central environmental data base. This identification scheme will allow sorting and recall of data by location, type, and other key information, as well as tracking of samples from collection and disposal.

Each sample collected during field work must be identified by a unique alphanumeric code with the following format:

CDI01-DS-01__

-- The first sequence begins with the character set "CD I", consistent with the labeling code used by USEPA for this property. The site code is followed by two digits indicating the sample number.

-- The second sequence consists of two characters (i.e., DS, for discrete soils, DD, for discrete sediments) that identify the sample matrix.

-- The third sequence consists of two digits indicating sampling interval (i.e., 01 would be the first interval, for example, 0 to 0.5 feet). These digits may be followed by two characters designating field QA/QC samples, when appropriate. In the above example, the last two spaces are left blank, since this is a field sample and not a QA/QC sample. QA/QC codes include:

  -- MS - Matrix Spike
  -- SD - Matrix Spike Duplicate
  -- MD - Matrix Duplicate
  -- FD - Field Duplicate
  -- RS - Rinsate Blank
  -- FB - Field Blank
  -- TB - Trip Blank

Hyphens must be inserted in sample ID numbers only as shown in the above example. Spaces will not be used. All letters must be capitalized.

The sample ID scheme described above shows the minimum number of characters that must be shown in a sample identifier. Additional sequences may be added if needed for a specific project; however, the number of characters may not exceed 30, including hyphens. Additional fields may be added only at the end of the standard ID sequence. If the project does require additional sequences or a different numbering system, the numbering scheme must be approved prior to use.

2.8 Sample Preservatives, Containers, and Holding Times

Samples for chemical analysis will be collected and preserved in accordance with appropriate USEPA specifications. For each parameter, the required type of container, volume of sample, sample temperature, type and concentration of preservative, and allowable holding times must be defined. All samples will be placed in individual pre-cleaned containers for shipment to the laboratory. The containers will be obtained from the laboratory designated to perform the analyses. The sample preservative, containerization, and holding times for chemical analyses are identified in the site-specific Work Plan; stated sample holding times must be met unless otherwise specified in the analytical method or site-specific Work Plan. The samples will be shipped by surface or overnight carrier to minimize the time between collection and laboratory processing.

Solid samples for chemical analysis will be packaged, labeled, and placed in coolers with ice as soon as possible after collection. Solid samples for physical properties analysis will be sealed in airtight plastic jars, sample liners, or bags for shipping to the laboratory. Water samples will be bottled, labeled, and placed in coolers immediately after sample collection. Samples will be kept at a constant temperature during storage and shipping per requirements of the analyses requested for the characterization and remediation efforts. If required by the site-specific Health and Safety Plan (HASP), personal monitoring samples will be sealed and shipped in ziploc bags and padded coolers to ensure that samples are not exposed to elevated temperatures.

2.9 Sample Packaging and Shipping

The following procedures will be followed for packing samples for shipment to the laboratory:

- Check all sample container caps for tightness.
- Tape cooler drain plug shut with strapping tape.
- Place the sample containers in the cooler, allowing sufficient space for the addition of packing material between the sample containers.
- Place bags of ice, blue ice packs, or equivalent on top of and between the samples. Sufficient ice must be used to ensure that the samples are transported at the correct temperature (4°C unless otherwise specified).
- Place a copy of the Chain-of-Custody form in a sealed clear plastic envelope and tape it to the underside of the cooler lid.
- Tape the shipping coolers shut with strapping tape if coolers will be transported by air courier.
- Affix custody seals securely to the coolers such that any attempt to open the coolers would be evident to the recipient.

Samples will be shipped at the end of each sampling day to the laboratory via surface or overnight courier so that samples will arrive no later than the day following sample collection.

3.0 EQUIPMENT DECONTAMINATION PROCEDURES

All equipment will arrive on-site in clean condition. All equipment used to collect samples will be decontaminated prior to use and between each use using the following or equivalent procedure:

- Place dirty equipment on plastic ground sheet or in similar containment area;
- Wash thoroughly with a laboratory detergent (Alconox or equivalent) to remove any particulate matter and/or surface films using bristle brush, as needed (sampling equipment with oil or other hard to remove materials may require rinsing with isopropanol prior to washing with the detergent solution);
- Rinse thoroughly with clean potable water;
- Rinse thoroughly with clean deionized water;
- Rinse with isopropanol;
- Rinse thoroughly with clean deionized water;
- Air-dry; and
- Wrap decontaminated equipment in aluminum foil (shiny side out) for storage and transportation.

Prior to the start of any drilling activities and between drilling locations, all drill rods, augers, and bits will be steam-cleaned. Power augers, etc. may be cleaned wither a power washer, steam cleaner, or hand washed with a brush using detergent to remove oil, grease, and hydraulic fluid from the exterior of the unit. These units should be rinsed thoroughly with potable water. Backhoe or track-hoe buckets should be decontaminated using a high-pressure

steam cleaner and potable water. The bucket should be wrapped in plastic for transportation between excavation locations.

Prior to implementing decontamination activities, an area will be designated for these activities. This area will be covered with plastic sheeting to prevent runoff of washwater generated during the decontamination operations. Liquids and wastes generated from decontaminating equipment will be contained for proper disposal.

4.0 DOCUMENTATION PROCEDURES

4.1 Daily Field Reports

A field activity daily log will be used as a record of daily field activities showing the sequence of events. At a minimum, the log will include the following information:

- Project name and number;
- Date;
- Starting/ending time and nature of each field activity;
- Names of all personnel on the site, including visitors;
- Weather conditions;
- References to appropriate field logs for details of each activity performed;
- Identification of any photographs taken;
- A list of rented, leased, or subcontracted equipment; and
- Signature of field manager or designee.

The field manager is responsible for ensuring that all activities are documented in the field activity daily log and that the details of each activity are recorded on the appropriate field documentation form. Regular field reports will be submitted to the project manager; these reports will highlight any significant variances from the sampling locations, depths, or procedures specified in the site-specific work plan.

4.2 Variance Log

Variances from approved operating procedures in the quality assurance project plan or the HASP will be discussed with the field manager and documented in the project file. Under the supervision of the field manager, the field staff will be responsible for initiating and chronologically maintaining a log of the variances. Variances affecting project scope and/or schedule must be approved by the project manager.

4.3 Sample Custody

All samples that are collected at a station will be accompanied by a Chain-of-Custody record (see Attachment A.1-2). The following information will be recorded in the indicated spaces to complete the Chain-of-Custody record:

- Project name and number;
- Name of sampler;
- The sample number, location, date and time collected, and sample type;
- Analyses requested;
- Any special instructions and/or sample hazards;
- Signature of sampler in the designated blocks, indicating his/her company, date, and time; and
- The condition of the sample on receipt will be completed and reported by the analytical laboratory.

The following chain-of-custody procedures will be followed for all samples submitted to the laboratory for chemical or physical properties analysis:

- Each individual field sampler is responsible for the care and custody of samples he or she collects until the samples are properly transferred to temporary storage or for shipping.

- A Chain-of-Custody form will be completed by the sampler for all samples collected and submitted to the laboratory.

- A custody seal will be signed, dated, and placed on shipping containers as necessary to detect tampering. Strapping tape should be placed over the seals to ensure that the seals are not accidentally broken during shipment.

- Each time responsibility for custody of a sample changes, the new sample custodian will sign the Chain-of-Custody form, and note the date and time that the change occurred.

- A copy of the carrier airbill will be retained as part of the permanent Chain-of-Custody record.

- The laboratory will record the condition of the sample containers upon receipt.

- The Chain-of-Custody form will be faxed to the project manager from the laboratory upon receipt of the samples.

- Changes or corrections to the information documented by the Chain-of-Custody form (including, but not limited to field sample ID or requested analyses) must be changed and initialed by the person requesting the change. In situations where the request comes from the project manager, a copy of the Chain-of-Custody form will be altered, initialed, and forwarded to the laboratory, where it will supersede the original Chain-of-Custody form.

- The original Chain-of-Custody form and any documented changes to the original will be returned from the laboratory as part of the final analytical report to the project manager. This record will be used to document sample custody transfer from the sampler to the laboratory and will become a permanent part of the project file.

- Samples received in the laboratory will be inspected for physical damage. The integrity of custody seals will be checked and noted. Sample coolers will be inspected to ensure ice added in the field is still present such that significant temperature variations should not have occurred during shipping. Sample identification numbers will be compared with Chain-of-Custody records. Samples will be logged and secured in controlled, refrigerated sample storage areas as necessary prior to analysis.

- The laboratory will maintain an internal Chain-of-Custody form, tracking custody of the samples within the lab. A copy of these forms will also be included with the data packages and become a permanent part of the Chain-of-Custody record in the project file.

4.4 Photographs

Color photographs may be taken of representative sampling locations and the surrounding site to show the area, sampling equipment, and related site activities. Frame and roll numbers will be logged on the appropriate field documentation form to identify photographs with the correct sampling location.

4.5 Document Maintenance

Field personnel are responsible for recording field activities on the appropriate field documentation form in sufficient detail to allow the significant aspects of the event to be

reconstructed without relying on memory. It is the responsibility of the field managers to ensure that all documents are complete and legible. At the end of each day, all documents completed that day will be reviewed by the field managers for accuracy, completeness, and legibility. Completed field documents (a copy or original, depending on the type of form) will be maintained on-site in chronological order with other completed forms of the same type until the completion of the field activity. Copies of specific forms will be sent to the project office on a weekly basis at a minimum for management purposes unless waived by the project manager. Upon completion of the field investigation, all original field records and copies will be transferred to the project manager for review. File and working copies will be retained by project personnel for data evaluation and report preparation, as necessary.

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ATTACHMENT A.1-1

Monitoring Well Sampling Form

200124

ENVIRON Ground Water Sampling Data Log

Site Name _____ Well or Surface Site No. _____

Site Location/Address _____ Sample Designation _____

Case Name _____ No. _____ Date, Time _____

Manager _____ Weather _____

Sampling Personnel _____

Water Level Measurements:

DTW (Nearest 0.01 ft.)	Elevation	Date, Time	Method Used (Slope Indicator No. or Other)	PID (ppm)

Depth to Bottom _____ (ft) - Depth to Water _____ (ft) x _____ Gal/Ft = Well Volume _____ Gallons

Well Evacuation:

# Gallons	# Well Volumes	Method Used	Flow Rate	Decon Method	Date, Time
					(begin)
					(end)

Field Water Quality Tests:

Well Vol #	# Gallons	pH	Conductivity (ms/cm)	Temp (°C)	D.O. (mg/L)	Redox	Turbidity	Comments

Sampling Data:

Sample Type (VOCs, etc.)	Date, Time	Sampling Method	Volume (ml)	Container Type	Depth Taken (ft)	Field Filtered (Yes/No)	Preservative	Sampler Cleaning Method (Circle)
								Lab decon
								Alconox wash
								H_2O rinse
								Distilled H_2O rinse
								MeOH rinse
								Acid rinse

Notes: (color, clarity, odors, etc.)

Well diameter _____ inches

Gallons per foot of casing/hole

2 in. = 0.163; 4 in. = 0. 653; 6 in. = 1.469

Total No. of Bottles _____ Signature _____

ATTACHMENT A.1-2

Sample Chain-of-Custody Form

ENVIRON

Counsel in Health and Environmental Science

CHAIN-of-CUSTODY FORM

Sheet Of
210 Carnegie Center, Suite 201
Princeton, New Jersey 08540
(609) 462-9000

PROJECT NAME: _____

CASE NO.: _____

ENVIRON SAMPLE ID.	COLLECTION DATE	COLLECTED BY (initials)	MATRIX	TOTAL NO. OF CONTAINERS	ANALYSES:												COMMENTS
TOTAL																	

Relinquished by:	Date:	Time:	Received by:	Company:	Date:	Time:

200126

APPENDIX A.2

Quality Assurance/Quality Control Protocols

APPENDIX A.2

Quality Assurance/Quality Control Protocols

TABLES

ATTACHMENT

1.0 INTRODUCTION

Quality assurance/quality control protocols should be followed during all sampling programs defined in site-specific Work Plans to ensure that the results of this sampling are of sufficient quality to meet the data quality objectives for the given project. The evaluation of data will generally involve the collection of QC samples in accordance with the sampling and analysis protocols. QC procedures for measurements not involving the collection of samples are limited to checking the reproducibility of the measurement in the field by obtaining multiple readings. The QA/QC protocols will also include the systematic validation of the analytical data and the management of the analytical data in electronic format.

2.0 INTERNAL QUALITY CONTROL

2.1 Calibration Procedures

This section provides the requirements for calibration of measuring and test equipment and instruments. The procedures are designed to ensure that all laboratory and field equipment and instrumentation are calibrated to operate within manufacturers' specifications and that the required traceability, sensitivity and precision of the equipment/instruments are maintained. Laboratory equipment will be calibrated according to the requested analytical method guidelines and the Laboratory QA/QC Plan.

Measuring and testing equipment will be calibrated against certified equipment having known valid relationships to nationally recognized standards and will be calibrated, adjusted and maintained at prescribed intervals or prior to use. Documented procedures will be used for calibrating or performing field checks on equipment. Whenever possible, widely accepted procedures such as those published by the USEPA, American National Standards Institute (ANSI), and the American Society for Testing Materials (ASTM), or procedures provided by the manufacturers, will be adopted.

Calibration and maintenance of field equipment will be in accordance with manufacturers' specifications or applicable test specifications, and will be documented. The method and interval of calibration for each item will be defined based on the type of equipment, stability characteristics, required accuracy, intended use, and other conditions that affect measurement control. When measuring and test equipment are found to be out of calibration, an evaluation will be made and documented of the validity of previous results obtained. Devices that are out of calibration will be tagged and segregated and will not be used until they have been recalibrated. If equipment is found consistently to be out of calibration, it will be replaced or repaired. A calibration will also be performed when the accuracy is suspect. Equipment will be handled and stored properly to maintain accuracy.

2.2 Quality Control Samples

Internal quality control includes contamination control samples (equipment, method, and trip blanks), precision control samples (field and laboratory duplicates), and accuracy control samples (spiked samples). A detailed listing of the types of quality assurance samples and the frequency of sampling is presented in Table A.2-1.

2.2.1 Contamination Control Samples (Equipment Rinsates and Trip Blanks)

Equipment rinsates are used to confirm that the sample bottle, sampling device, and the sampling procedure are not contaminating the sample. Contaminant-free water is transported to the sampling point, poured over or through the sample collection device, collected in a sample container, preserved, and returned to the laboratory for analysis.

2.2.2 Precision Control Samples (Field Duplicate Samples)

Analysis of duplicate samples provides information concerning the precision of the sampling and analytical processes. Two or more samples are taken in the field so that they represent the sample matrix as closely as possible. The results obtained from the measurement of field replicate samples reflect the total precision of the sampling and analytical procedures and the variability in obtaining samples that supposedly represent one sampling point.

2.2.3 Accuracy Control (Field Spiked Samples)

A field spiking program will not be implemented unless a specific need arises that cannot be rectified by laboratory quality control or blind QA/QC samples.

2.3 Laboratory Quality Controls

2.3.1 Contamination Control Samples (Method Blanks)

For each batch of samples processed, method blanks (using ASTM Type I to IV water and reagents) are carried throughout the sample preparation and analytical processes. These blanks are used to assess whether samples are being contaminated in the laboratory.

Method blanks are specific for each analytical method, and each batch of 20 or fewer samples.

2.3.2 Accuracy and Precision Control Samples (Matrix Spike, Matrix Spike Duplicate, Laboratory Control, Laboratory Duplicate, and Surrogate Spiked Samples)

A matrix spike and a matrix spike duplicate sample are created when the analyst adds a known amount of an analyte of interest into a portion of an environmental sample. The data from a matrix spike provide information on the matrix effects of a particular sample. The acceptance criteria for the results of analysis of spiked samples are the limits of recovery defined in the USEPA methods identified in the site-specific Work Plan.

TABLE A.2-1
Frequency of Analysis of Quality Assurance Samples

QA Sample Type	Frequency of Analysis
Contamination Control Samples	
Laboratory Method Blank	One per each analytical method. One in every batch of samples (not to exceed 20 samples).
Trip Blank	One per cooler if VOCs are tested; analyze for VOCs only.
Equipment Rinsate/Field Blank	One per analytical method. One per sampling day/event or one per 20 samples.
Accuracy Control Samples	
Performance or Blind Check Samples	As needed based on QA/QC review.
Surrogate Spiked Samples	Surrogate will be spiked and analyzed in all samples and in all blanks for GC and GC/MS methods.
Matrix Spike Samples	One per 20 samples; performed on field designated samples.
Precision Control Samples	
Field Replicate (Duplicate) Sample	One per each analytical method. One out of every 20 samples.
Matrix Spike Duplicate Samples	One per 20 samples; performed on field designated samples.

Laboratory control samples (LCS) represent laboratory control matrix spikes in which a consistent matrix is spiked with a known analyte level in the normal analytical range. The purpose of the control sample is to check the precision and accuracy of the method and the laboratory procedures. The results of a control sample analysis must fall within ± 3 standard deviations (control limits) of the average recovered concentrations. (A control sample must be analyzed and yield results within standard control limits before samples can be analyzed.)

A laboratory duplicate consists of a duplicate sample analysis performed for inorganics by the laboratory. The percent difference data generated by these analyses are used to indicate the precision of the sample results and evaluate the long-term precision of the methods within the confines of the sample matrix.

A surrogate spike sample is created when measured amounts of certain compounds are added before sample preparation or extraction (except for volatile samples, which are spiked prior to analysis). The analyst measures the recovery of the surrogate to determine systematic extraction or analysis problems. Surrogate spike recoveries should fall within the control limits specified in the prescribed USEPA methods identified in the Work Plan. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates outside of the quantification limit; assessment of the analytical quality in these cases will be based on the quality control results from other spiked samples.

3.0 DATA REPORTING, ASSESSMENT AND VALIDATION

Collection and ultimate presentation of reliable data is a primary focus of the characterization activities. The effort to ensure reliable data begins prior to data collection as sampling and analysis procedures are evaluated in regard to their ability to generate the appropriate, technically acceptable information required to achieve project objectives. This QAPP meets this requirement by establishing objectives in terms of quality parameters, analytical methods, and protocols. During and after data collection, results are assessed to assure that the procedures are effective and that the data generated provides sufficient information to achieve project objectives. All data collected during the removal action will be managed, distributed and preserved to substantiate and document that the data are of known quality and properly maintained.

3.1 Laboratory Analytical Data Deliverables

The analytical data verification program is primarily designed to ensure that documentation and data are reported using established reporting requirements and that all requested analyses are performed. This process will be completed in accordance with approved procedures. Data assessment and reporting by the laboratory will be performed according to method specifications. The remainder of the data verification program consists of tracking of data delivery and review of the following: sample identification, Chain-of-Custody forms, analytical holding times, requested turnaround time, data results, and data quality parameters.

3.1.1 Data Reporting

The data will be reported in a format that will allow the review and/or validation of samples analyzed under the protocols described in the site-specific Work Plan. The data package will include all the elements required to validate deliverable data. The data package will be prefaced by a Data Summary Report which summarizes the sample and QC results detailed in the complete data package. The Data Summary Report will include all sample tracking information such as title page, sample cross reference, sample analysis request form, field Chain-of-Custody form, and internal chain-of-custodies delineating internal sample transfers or subcontracted analyses. The complete data package will

include all elements of the Data Summary Report plus all relevant data as outlined in Table A.2-2. The laboratory data packages will contain the following items:

- Laboratory name and address;
- Case narrative which includes general comments, a description of the sample types, analyses performed, any sample reanalysis performed, problems encountered, and corrective action results. Specific information regarding quality control results that are outside the control limits or other factors that affect the data use will be discussed. These discussion will include the problem, corrective action, results of corrective action, and effect on the reported results.
- Sample cross reference;
- Completed Chain-of-Custody forms;
- Method reference; and
- Relevant summary forms specified in Tables A.2-2.

The form numbers listed in Tables A.2-2 refer to CLP forms; however, summary forms contained in Chapter ONE of SW-846, Third Edition (Revision 0, 1986) or equivalent may be used.

Delivery of analytical data will be tracked to ensure that the requested laboratory services are performed in an accurate and timely manner. Data delivery is logged manually on the Chain-of-Custody form. After the data reports are received, they are to be reviewed to determine if all contractual format requirements have been met. In addition, data are to be reviewed to confirm that all requested parameters are received. All analytical data will be reviewed by technical personnel familiar with the monitoring program or investigation. Sample data will also be compared with the QA/QC samples collected or analyzed within the same sample lot. The data review will be used to report inconsistencies in concentrations, sampling procedures, and sample identification.

3.1.2 Laboratory Data Review

Prior to submission of analytical data, the analytical laboratory will review the data with respect to the analytical method requirements. The analytical laboratory will review the analytical data and data package to ensure:

- Holding times have not been exceeded;
- Sample preparation information is correct and complete;
- Analysis information is correct and complete;
- The appropriate analytical methods and/or SOPs have been followed;

TABLE A.2-2 Deliverables Required for Analytical Data Package
Polychlorinated Biphenyls (PCBs) - Method SW8082
QC SUMMARY
Tabulated Target Compound Results for Samples, Method Blanks and MS/MSDs, (non-spiked compounds) (CLP Form I Pest or equivalent)
Surrogate Percent Recovery Summary (CLP Form II Pest or equivalent)
Matrix Spike/Matrix Spike Duplicate Summary (CLP Form III Pest or equivalent)
Method Blank Summary (CLP Form IV Pest or equivalent)
Initial Calibration (CLP Form VI Pest or equivalent)
Final Calibration (CLP Form VII Pest or equivalent)
Surrogate Retention Times (CLP Form VIII Pest or equivalent)
PCB Standards Summary -- All Columns (CLP Form IX Pest or equivalent)
PCB Identification -- Positive Results Only (CLP Form X Pest or equivalent)
Analytical Sequence Form (CLP Form XII Pest or equivalent)
COMPLETE DATA PACKAGE
Sample Data
Chromatograms -- All Columns
Data System Printouts -- All Columns
Manual Work Sheets
GC/MS Configuration Data -- Spectra
Standard Data
PCB Standard Chromatograms and Data System Printouts for All Associated Standards
Raw QC Data
Blank Data
Chromatograms and Data System Printouts -- All Columns
Matrix Spike/Matrix Spike Duplicate
Chromatograms and Data System Printouts

- Instrument calibration and QC data are within prescribed limits and documented;
- QC samples are within prescribed control limits;
- Any special sample preparation and analytical requests have been met;
- Component identification is correct;
- Quantitative results are correct;
- Common laboratory contaminants are identified;
- Unexpected results are noted; and
- Data package (to include electronic deliverables) is complete and acceptable for transmittal.

All data will be reviewed by someone other than the analyst who generated the data. Any errors that are identified and corrected during the review process should be documented. Clarification of procedures and/or additional training should be implemented to ensure that the errors do not recur. Samples will be reanalyzed as deemed appropriate by the laboratory personnel.

3.2 Assessment of Field Data

Field data collected during the field activities will be assessed by checking the procedures used and comparing the data to previous measurements. Field QC samples will be evaluated to ensure that field measurements and sampling protocols have been observed and followed. The following will be assessed:

- Use of standard operating procedures;
- Calibration method and frequency;
- QC lot number;
- Date and time sampled;
- Preservation;
- Samplers;
- Laboratory;
- Chain-of-Custody forms; and
- Date shipped.

The field data will be reported as follows:

- Ground surfaces will be surveyed to 0.01-foot, horizontal coordinates to the nearest 0.1 foot; and

- Sampler blow counts will be rounded to the nearest blow per 6-inch sampling interval.

Data obtained from field measurements will be assessed by the field staff. The validity of all data will be determined by checking calibration procedures utilized in the field, and by comparing the data to previous measurements, if any, at the specific site. Large variations (greater than 50 percent) will be examined for possible recollection of data or assignment to a lower level of analytical data quality.

3.3 Data Validation

Data validation is the process of reviewing laboratory records of analytical data and quality-related field data to assess laboratory performance as compared to QC criteria, data quality requirements, and procedural requirements. The purpose of validation is to document the quality and usefulness of the data and the documentation developed during the sample analysis; in particular, the purpose of the data validation is to determine if any quantitative problems are evident from the laboratory QA/QC data, not to verify whether the laboratory reported QA/QC information is correct. Specific performance criteria to be used for this review will follow the appropriate analytical method. Where no criteria exist, performance criteria will follow the appropriate Functional Guidelines and USEPA regional guidance. Validation of analytical data will include an evaluation of data quality parameters, false negatives and negatives, and detection limits.

Calculations that interpret and analyze data will be performed in a planned, controlled, and documented manner. Calculation documentation for interpretation and analysis will be provided, such that a technically qualified person may review, understand, verify, and duplicate the calculations without recourse to the originator. Calculations will be legible, complete, and in a form suitable for reproduction, filing, and retrieval. Calculations will be identifiable by subject, originator, reviewer, and date. Calculation documentation will include the following:

- Definition of the objective of the interpretation/analysis;
- Definition of inputs and their sources;
- A listing of applicable references;
- Results of literature searches or other background data;
- Identification of assumptions;
- Identification of any computer calculations, including computer type, program name; revision, input, output, evidence of program verification, and the bases of application to the specific problem; and

- Signature and dates of the review and approval by appropriate qualified personnel.

The data validation process consists of reviewing and evaluating the analytical documentation supporting the data resulting from laboratory analyses. The analytical process itself is first evaluated by reviewing the laboratory analytical records to ensure compliance with the procedures governing the analyses. These records may include, but are not limited to, sample custody records, sample preservation logs, instrument printouts, calibration checks, and initial calibration data. Second, the data validation process evaluates the data for precision, accuracy, and completeness by comparing the data to the field blank, duplicate sample, and MS/MSD sample analysis results and the corresponding laboratory QA/QC data.

At a minimum, ENVIRON will review and qualify 100% of the data packages by reviewing the applicable summary forms (Tables listed in Table A.2-2) and certain raw data for the items listed below. The data packages will be reviewed against performance criteria in the appropriate analytical method and the data quality objectives (DQOs) defined for the given project. All analytical results will be reviewed, and for each analyte (in each matrix) the following items will be assessed as appropriate:

- Surrogate percent recoveries;
- Method blank data;
- GC/MS tuning and mass calibrations;
- Initial calibration summaries;
- Continuing calibration summaries;
- Matrix spike recoveries;
- Matrix spike/matrix spike duplicates;
- Field duplicates;
- Field and trip blanks;
- Identification of outliers; and
- Calculation of overall completeness.

The laboratory results will also be reviewed for:

- Unexpected results;
- Common laboratory contaminants; and
- Unusual spatial concentration/analyte relationships.

If problems are noted in this review, the data packages will be further reviewed to determine if the problem is random or systematic. If systematic problems are noted the

analytical laboratory will be contacted immediately. Data are qualified based on the results of this validation.

3.4 Data Qualification

The purpose of the data qualification process is to determine and summarize the quality and reliability of the analytical data and to document any factors which affect the data usability. The data qualification process consist of a review of the laboratory and field data. Qualification will be performed by ENVIRON. The data will be qualified as "accepted without any qualifications"(no flag), "accepted with noted qualifications"(flagged with a "J" or "UJ", or "unusable" (rejected, flagged with an "R") based upon the review process. ENVIRON will determine if "rejected" results are critical to the program and resampling and reanalysis is required. Information used in the qualification process will include:

- Chain-of-custody documents;
- Laboratory data packages;
- Information from the sampling team on field conditions and field QC samples;
- Sampling location;
- List of all field samples obtained; and
- This QAPP.

4.0 DATA MANAGEMENT AND RESULTS REPORTING

4.1 Data Management

Environmental data will be prepared in a manner consistent with ENVIRON's Electronic Data Deliverables Format Specification Document (EDD) (see Attachment A.2-1). In order to standardize data entry into the data base, all field and analytical data, custody records, and sample delivery group information will conform to the format specified in these SOPs. The EDD has been implemented to ensure that data quality standards are being met. The data base is intended to enhance the data review process by standardizing the structure and terminology of data elements collected and reported by field investigation contractors and laboratories, to serve as a central repository for storage and retrieval of data, and to allow flexible exportation of data to major software applications supported by ENVIRON.

The data base is intended to store only final analysis results, so multiple sample reanalyses will not be included.

4.2 Data Reporting

All data reports resulting from the implementation of a site-specific Work Plan should consist of a presentation of the raw analytical data, summaries of the validation and verification effort, as well as interpretative efforts relative to the data.

5.0 PERFORMANCE AND SYSTEM AUDITS

5.1 Performance and System Audit Procedures

This section provides requirements for the planning, scheduling and conducting of audits and surveillances to verify that site activities are being performed efficiently in conformance with approved plans, standards, federal and state regulatory requirements, sound scientific practices, and contract requirements. Planned and scheduled audits will be performed to verify compliance with aspects of the QA program and to evaluate its effectiveness. Audits will include an objective examination of work areas, activities, processes, review of documents and records, interviews with project personnel, and review of plans and standards.

Performance and system audits area key mechanism for ensuring technical and procedural compliance with the Work Plan. The purpose of the audits are:

- To verify that the field and laboratory QA procedures documented in this QAPP are properly followed and executed;
- To check that appropriate documents are properly completed and are kept current and orderly;
- To ensure that measurement systems are accurate; and
- To identify nonconformance or deficiencies and to initiate necessary corrective actions.

The project managers and the project QA manager are responsible for assuring conformance with standard operating procedures. At least one field audit per Property will be performed. Laboratories should conduct monthly or bimonthly internal audits.

Activities that have been selected for audit will be evaluated against specified requirements, which will include an evaluation of the method, procedures, and instructions. Documents and records will be examined as necessary to evaluate whether the QA program is effective and properly implemented. Reports and recommendations must be prepared on all audits and submitted to the QA manager for retention in the project files.

5.1.1 Review of Sampling Program

As field documentation is generated, it will be reviewed by the project manager for accuracy, completeness, and compliance with the QAPP requirements. Field sampling procedures will be audited periodically by the program manager for compliance with QAPP procedures. The audit will check that:

- Sample protocols are followed;
- Field measurements are done correctly;
- Field documentation is completed;
- Samples are placed in proper containers;
- Samples are stored and transported properly; and
- Sample custody procedures are followed.

5.1.2 Review of Laboratory Procedures and Analytical Results

Laboratory procedures are reviewed by the laboratory's QA officer whenever a beyond-control limit situation is found. Analytical results are checked by the laboratory manager or other client services individuals prior to final distribution.

5.1.3 Technical Review

Technical review of various disciplines (e.g. construction, engineering) will be provided by the appropriate technical managers through periodic peer reviews. Technical reviews will be conducted at various phases of the tasks. These reviews are intended to assure the technical feasibility, accuracy, thoroughness, and soundness of the work performed by the technical staff.

5.1.4 Management Review

The program manager or designated manager will review the execution of the quality assurance program on a regular basis. The review may include training of personnel, manpower commitments and proper coordination of efforts and schedules.

5.2 Preventive Maintenance

A preventive maintenance program will, at a minimum, be established for equipment and systems that would otherwise be subject to breakdown, when the breakdown could lead to safety hazards, waste release, or significant loss of completeness and accuracy in data. The preventive maintenance schedule will be developed based on the appropriate manufacturer's recommendations.

Laboratory analytical instruments will be subject to regular preventive maintenance by laboratory personnel or representatives of the equipment manufacturer. Daily checks of each instrument will be made by the analyst who has been assigned responsibility for that instrument. This will include activities such as changing GC inlet liners, checking operation of data systems, checking for leaks, and other similar procedures recommended by the equipment manufacturer.

Field instruments will be checked daily and prior to use by the person responsible for use of each instrument. Instruments will be calibrated in the field on a daily basis during project implementation as described in Section 2 and maintained in accordance with manufacturer's instructions. Maintenance and performance logs will be maintained for all equipment and instruments and should include:

- Name of the equipment and manufacturer;
- Model and serial number;
- Date equipment placed into service;
- Instructions for proper maintenance/performance checks and the name of the person performing; and
- Nature, cause and name of person performing repairs due to malfunctions.

5.3 Corrective Action Procedures

The need for corrective action may be identified by system or performance audits or by standard QA procedures. In addition, all technical staff will be responsible for reporting questionable technical or quality control nonconformances to the appropriate QA officer. When a nonconformance or deficiency is identified, corrective action will be implemented by the project QA manager. The corrective action process will involve the following:

- Reviewing questionable data with respect to predetermined limits for data acceptability;
- Identifying and defining problems for which corrective action is required;
- Assigning responsibility for investigating the problem;
- Determining disposition or action to be taken (this may include reanalysis, resampling and analysis, remeasurement of field data);
- Assigning and accepting responsibility for implementing the corrective action;
- Evaluating the disposition of corrective action results; and
- Documenting the corrective action taken and results.

For each measurement system, the project QA manager will be responsible for initiating the corrective action. The laboratory supervisor will be responsible for implementing corrective action in the laboratory, and the on-site field manager will be responsible for implementing corrective action in the field. The corrective action taken will depend on the QA/QC data that did no meet the necessary criteria, and may range from qualifying the data to resampling at the site. The program manager will be responsible for ensuring that the corrective action has indeed been taken and that it adequately addresses the nonconformance.

The project QA manager is authorized to stop work until an unsatisfactory condition has been corrected. In this case, the project QA manager is responsible for verifying that the unsatisfactory condition has been resolved and for authorizing work resumptions.

5.4 Quality Assurance Reports

The project quality assurance manager or designee will review aspects of the implementation of the program following each round of sampling and at the conclusion of the project and submit a summary report to the program manager. These reviews will include an evaluation of the data quality assessment activities, the results of audits and surveillances (as appropriate), and an assessment of the status of nonconformances and corrective actions. The final project report will also include a separate QA section that will summarize the overall data assessment and validation in accordance with the data quality objectives outlined in the QAPP.

Significant nonconformances or quality problems will be reported to the principal for evaluation and possible management action. Examples of significant nonconformances or quality problems include the following:

- Failure of an organization to establish and implement appropriate QA and technical requirements, plans and procedures.

- Continuous or repetitive program inadequacies, deviations or noncompliances and failure of appropriate organizations to provide proper direction, overview, or correction.

- Failure of project organizations to take reasonably prompt and effective actions to correct deficiencies.

Comprehensive records will be maintained to provide evidence of the quality assurance activities. The program manager will be responsible for ensuring that quality assurance records are properly stored and that they can be retrieved.

ATTACHMENT A.2-1

Electronic Data Deliverables Format Specification Document
(Effective July 1997)

1.0 GENERAL REQUIREMENTS

1.1 Transfer Media

Files must be transferred to ENVIRON Corporation on MS-DOS formatted diskettes (i.e., IBM). The recommended size/density for these diskettes is 3.5 inch/1.44 Megabyte diskettes. Each Sample Delivery Group (SDG) (i.e., data pack) should be sent on a separate diskette.

Note: For large volumes of data (e.g., 10 SDGs or data files in excess of 1 MB), contact the ENVIRON Environmental DBA to discuss alternatives.

1.2 Character Set

ENVIRON Corporation data files must be provided in the ASCII Character Set. Furthermore, all character information, except for *analyte* field values, must be provided in ***UPPER CASE***. The *analyte* field may be provided in mixed case.

1.3 Record Terminator

Within each data file, the individual records must be terminated by a carriage return (ASCII Character 13).

1.4 Field Delimiter

The required field delimiter is the comma character (,, ASCII Character 44).

To further ensure the field delimitation, ENVIRON Corporation requires the inclusion of double quotes (", ASCII Character 34) on either side of character data field values (e.g., "1,2,3-Trichloroethane",34.4,"B",10.0,"MG/L"). Double quotes must not be placed around numeric values.

1.5 White space

All extraneous white space characters (e.g., spaces, tabs, blanks) must be eradicated from the data file. All data fields must be trimmed (i.e., clipped) to remove leading and trailing white space.

1.6 Diskette Label

The diskette label must contain the following information:

- Project Name
- Project Point of Contact
- Laboratory Name
- Laboratory Job
- File Names contained on diskette

1.7 Transfer of data diskettes to ENVIRON

The following guidelines must be followed for the shipping of data diskettes to ENVIRON:

- Diskette should be shipped at the same time as the data pack for the SDG.
- Diskettes must be shipped to ENVIRON in appropriate protective packaging.
- The outside of the package must be clearly labeled with the following: *Magnetic Media Enclosed -- DO NOT X-RAY*, regardless of the shipper used.

2.0 ANALYTICAL SAMPLE RESULTS FILE

2.1 Overview

The analytical results file captures the final results of each of the analyses run on the set of field samples. To facilitate the loading process, these records should be sorted in ascending order by the following fields:

- FIELD ID
- METHOD
- LAB SAMPLE ID
- ANALYSIS DATE
- LAB NAME

SPECIAL NOTE
Unless specifically requested, the following classes of QA results should be omitted from the Analytical Sample Results File: • Surrogate Recovery • Lab Duplicate • Matrix Spike • Method Blank

2.2 File Information

2.2.1 File Name

The sample results data records must be provided in a file called *<SDG>.C3*; where <SDG> stands for the identifier for sample delivery group being transmitted.

2.2.2 File Contents

This file should include the optimal sample results records for the current SDG being reported, except for analyses with the unacceptable results for a given sample.

For example, if there is a high concentration of arsenic in the sample, requiring several dilutions to bring the value within the calibration limits of the equipments, only the final dilution of arsenic should be reported. However, the other analytes that were within bounds prior to dilution of the sample should be reported at the original dilution.

2.3 Chain of Custody Correspondence

The information provided in the analytical sample results data records must strictly correspond to the information reported to the laboratory on the Chain of Custody. This information may not be altered, have additional information appended to it, or have additional information prefixed to it.

SPECIAL NOTE
The following fields must *exactly* match the information provided on the chain of custody: • Field ID • Matrix • Method

For example, if the Field ID reported on the chain of custody is 1786H-MW01-950501, that is the string which must be returned -- not 1786H-MW01-950501R, not 1786H-MW01-950501DL, not 1786H-MW01-950501RE. These types of additions are acceptable on the Lab ID and the EPA ID field values.

2.4 Data Record Structure

The following table defines the record structure for the analytical sample results data records. All fields listed in the record structure must be included in the data record. If a particular data field is not available, a null placeholder must be placed in the data record to account for the missing value (e.g., "Field 1 Value",,"Field 3 Value",...).

Note: All fields marked with a Y in the Req. (Required) column in the table below must be populated in the data record.

Field Seq.	Field	Type	Max Size	Description/Comments	Req.
1	SITE	CHAR	30	Site name where the sample was taken.	N
2	LOCATION	CHAR	30	Location (i.e., node) where the sample was taken.	N
3	LABNAME	CHAR	30	Name of the lab performing the analysis.	Y
4	SDG	CHAR	20	Sample Delivery Group or Lab Batch ID associated with the sample.	Y
5	FIELDID	CHAR	50	Sample ID as it appears on the Chain of Custody.	Y
6	EPASAMPLEID	CHAR	30	EPA Sample ID.	N
7	QAQCTYPE	CHAR	30	QA/QC classification of the sample (if applicable). Expected values include: • BASE SAMPLE • TRIP BLANK • FIELD BLANK • FIELD DUPLICATE • WASH BLANK	Y
8	MATRIX	CHAR	30	Sample medium. Expected values include: • BLANK WATER • GROUND WATER • SOIL • SURFACE WATER • SEDIMENT	Y
9	LABSAMPLEID	CHAR	30	Sample ID assigned by the lab.	Y
10	METHOD	CHAR	50	Analysis method name and number. *Note: Must match CoC exactly.*	Y
11	SAMPLEDATE	DATE		Date sample was taken, as it appears on the Chain of Custody. Required Format: MM/DD/YY HH:MM	Y
12	RECEIVEDATE	DATE		Date sample was received at the lab. Required Format: MM/DD/YY HH:MM	N
13	EXTRACTDATE	DATE		Date sample was extracted or prepared by the lab. Required Format: MM/DD/YY HH:MM	N
14	ANALYSISDATE	DATE		Date sample was analyzed. Required Format: MM/DD/YY HH:MM	N
15	PREPLEVEL	CHAR	10	Fractional analysis information. Expected values include: • TOTAL • DISSOLVED • TCLP • SYN • EP	Y
16	COLORBEFORE	CHAR	10	Color of the sample before analysis.	N
17	COLORAFTER	CHAR	10	Color of the sample after analysis.	N
18	CLARITYBEFORE	CHAR	10	Clarity of the sample before analysis.	N
19	CLARITYAFTER	CHAR	10	Clarity of the sample after analysis.	N
20	TEXTURE	CHAR	10	Texture of the Sample.	N
21	PERCENT SOLID	NUMBER		Percent solid of the sample; inverse of moisture.	Y

Field Seq.	Field	Type	Max Size	Description/Comments	Req.
22	TEST	CHAR	50	Laboratory testing details. Expected values include: • DILUTION • REEXTRACTION	Y
23	TESTVERSION	CHAR	10	Run number of the test or method.	N
24	CAS	CHAR	50	CAS number associated with the chemical analyte.	Y
25	ANALYTE	CHAR	50	Name of the chemical analyte.	Y
26	RESULT	NUMBER		Numeric result of the chemical analyte. This is a numeric field; therefore, it must be a number. Strings like N/A, BMDL, ND, N/D etc. cannot be used to flag concentrations below detection limit and/or non-detects in this field; use DL QUALIFIER field. *Note:* For non-detects, leave null.	Y
27	ERROR	NUMBER		Error factor for the chemical analysis.	N
28	UNITS	CHAR	10	Units of measure associated with the chemical analysis.	Y
29	DILUTION	NUMBER		Dilution factor associated with the chemical analysis.	Y
30	DETECTLIMIT	NUMBER		Detection limit associated with the chemical analysis.	Y
31	DLQUALIFIER	CHAR	15	Detection limit or report qualifier associated with the analysis.	Y
32	LABQUALIFER	CHAR	10	Lab qualifier associated with the chemical analysis.	Y
33	SURROGATE	CHAR	1	Indication whether or not the result represents a surrogates recovery analysis. Expected values include: • N (No) • Y (Yes)	Y
34	COMMENTS	CHAR	240	Any comments associated with the chemical analysis.	N

APPENDIX B

Property Restoration Plan

200153

APPENDIX B

Property Restoration Plan

ATTACHMENT

1.0 INTRODUCTION

This restoration plan outlines the scope of work for replacing existing landscape features that may be disturbed as a result of the excavation, removal and transportation of polychlorinated biphenyl (PCB) contaminated soils associated with the removal action at six residential properties surrounding the Hamilton Industrial Park (former site of Cornell-Dublier Electronics, Inc.) in South Plainfield, New Jersey.

2.0 SITE DESCRIPTION

The remedial action work activities will take place at six residential properties located in the borough of South Plainfield, New Jersey. These properties are located along Spicer Avenue, immediately southwest of the former Cornell-Dubilier Electronics site, now known as the Hamilton Industrial Park (The Site). The properties are identified as follows:

501 Garibaldi Avenue (Property B)
500 Garibaldi Avenue (Property C)
204 Spicer Avenue (Property E)
210 Spicer Avenue (Property F)
305 Spicer Avenue (Property I)
501 Hamilton Boulevard (Property N)

3.0 RESTORATION PLAN

Existing landscaping and physical site features (e.g., swimming pools, fences) were inventoried by Maser Consulting, P.A. (Maser) of Matawan, New Jersey in September 1998. Following completion of excavation activities each work day, the excavated areas will be backfilled with clean soil and graded to original condition. Once backfilling activities have been completed at a property, the landscaping will be restored to existing conditions or equivalent value. Landscaping will be conducted by a landscaping contractor in accordance with the planting plan presented on the certified landscape architecture plans prepared by Maser; the landscape plan for each of the six properties is provided in Attachment B.1. As part of the property restoration, fences and other physical features disturbed during soil excavation will be reinstalled in the original locations as presented in Attachment B.1. The timing of complete restoration of landscaping and other physical features will be dependent on the season and weather conditions.

H:\LOVERDE\025840C\WORKPLAN\APPDX_B.WPD

ATTACHMENT B.1

As-Built Replacement Landscape Plans

EPRESENTS APPROXIMATE LOCATIONS OF PREVIOUSLY EXISTING PLANTING.
OPOSED DISTURBANCE ARE APPROXIMATE AND SUBJECT TO FIELD VERIFICATION.

SION TO REMOVAL AREAS.

DESCRIPTION

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

MATAWAN OFFICE
Victoria Plaza
30 Freneau Avenue (Route 79)
Matawan, N.J. 07747
Phone (732) 583-5900
Fax (732) 583-6619
E-mail - solutions@maserconsulting.com

Regional Offices
Flanders, N.J.
Hamilton, N.J.
Toms River, N.J.
New York City, N.Y.
New Windsor, N.Y.

AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY B
LOT 1.01, BLOCK 336
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200159

JOB NUMBER: 98-439A	DATE: SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01FW	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

ESENTS APPROXIMATE LOCATIONS OF PREVIOUSLY EXISTING PLANTING.
OSED DISTURBANCE ARE APPROXIMATE AND SUBJECT TO FIELD VERIFICATION.

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REVISION

DESCRIPTION

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

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Fax (732) 583-6619
E-mail - solutions@maserconsulting.com

Regional Offices
Flanders, N.J.
Hamilton, N.J.
Toms River, N.J.
New York City, N.Y.
New Windsor, N.Y.

AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY C
LOT 12, BLOCK 337
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200160

JOB NUMBER: 98-439A	DATE: SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01G5	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

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TO REMOVAL AREAS.

ON.

DESCRIPTION

MASER CONSULTING P.A.
onsulting, Municipal & Environmental Engineers
lanners ▪ Surveyors ▪ Landscape Architects

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Victoria Plaza
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Phone (732) 583-5900
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E-mail - solutions@maserconsulting.com

Regional Offices
Flanders, N.J.
Hamilton, N.J.
Toms River, N.J.
New York City, N.Y.
New Windsor, N.Y.

AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY E
LOT 12.01, BLOCK 336
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200161

JOB NUMBER:	DATE:
98-439A	SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01FM	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

SENTS APPROXIMATE LOCATIONS OF PREVIOUSLY EXISTING PLANTING.
SED DISTURBANCE ARE APPROXIMATE AND SUBJECT TO FIELD VERIFICATION.

1 TO REMOVAL AREAS.

DESCRIPTION

MASER CONSULTING P.A.
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Hamilton, N.J.
Toms River, N.J.
New York City, N.Y.
New Windsor, N.Y.

AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY F
LOT 11.01, BLOCK 336
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200162

JOB NUMBER:	DATE:
98-439A	SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01FS	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

THIS MAP IS AN OVERSIZED DOCUMENT. IT IS AVAILABLE FOR REVIEW AT:
U. S. EPA, REGION 2 SUPERFUND RECORDS CENTER
290 BROADWAY, 18TH FLOOR,
NEW YORK, NY 10007

N TO REMOVAL AREAS.

DESCRIPTION

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

MATAWAN OFFICE
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New York City, N.Y.
New Windsor, N.Y.

AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY I
LOT 12, BLOCK 336
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200163

JOB NUMBER: 98-439A	DATE: SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01G1	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

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AS-BUILT REPLACEMENT LANDSCAPE PLAN
FOR
ENVIRON CORPORATION
PROPERTY N
LOT 1, BLOCK 336
SITUATED IN
BOROUGH OF SOUTH PLAINFIELD
MIDDLESEX COUNTY
NEW JERSEY

200164

JOB NUMBER: 98-439A	DATE: SEPT. 24, 1998
SCALE: 1"=20'	LATEST REVISION:
INDEX NUMBER: MA01FY	DESIGN BY: -----
SHEET NUMBER: 1 of 1	

APPENDIX C

Treatment and Disposal Facility Information

APPENDIX C

LANDFILLS AND TREATMENT FACILITIES CONSIDERED FOR THE RESIDENTIAL PROPERTY REMOVAL ACTION

1. GROWS Inc. Landfill, Morrisville, PA

Complete Mailing Address:

Waste Management of Pennsylvania, Inc.
1121 Bordentown Road
Morrisville, PA 19067

Classification: Subtitle D facility
PCB Concentration Limit: 50 ppm
Approval to Accept CERCLA Waste that is otherwise Nonhazardous:

Yes. Letter available from the EPA Region III dated April 10, 1995 confirming approval for GROWS landfill to accept non-hazardous CERCLA waste from any site within Region III.

Additional Requirements:

None identified

2. Clean Earth, New Castle, DE

Complete Mailing Address:

Clean Earth of New Castle, Inc.
94 Pyles lane
P.O. Box 1049
New Castle, DE 19720-1049

Classification: Thermal Treatment Facility, Delaware Permit # SW-9507
PCB Concentration Limit: 40 ppm
Approval to Accept CERCLA Waste that is otherwise Non-Hazardous:

- The facility is allowed to accept CERCLA waste, although no documentation on the status of this authorization was provided.

Additional Requirements:

- Transporters must have a valid Delaware Solid Waste Hauler's Permit (DE/SW).
- Chemical analysis of one representative composite sample per 1000 tons must be performed by the facility.

3. **Middlesex County Landfill (MCLF), East Brunswick, NJ**

Complete Mailing Address:

Middlesex County Landfill
53 Edgeboro Road
East Brunswick, NJ 08816

Classification: Subtitle D facility
PCB Concentration Limit: 50 ppm
Approval to Accept CERCLA Waste that is otherwise Non-Hazardous:

- Unknown. Landfill can accept Non-Hazardous Industrial Waste (New Jersey ID27).

Additional Requirements:

- NJDEP must classify the waste as ID27 (industrial non-hazardous waste)
- Use a NJDEP registered hauler.

4. **CWM Chemical Services, Model City, NY**

Complete Mailing Address:

CWM Chemical Services, L.L.C.
1550 Balmer Road
P.O. Box 200
Model City, NY 14107

Classification: Subtitle C facility
PCB Concentration Limit: 500 ppm
Approval to Accept CERCLA Waste that is otherwise Non-Hazardous:

- Yes. Documentation for approval is not available, but CERCLA waste is not on the landfill's "banned" list.

Additional Requirements:

- Use a NYSDEC registered hauler.

5. **High Acres Landfill, Fairport, NY**

Complete Mailing Address:

Waste Management of New York, Inc.
High Acres Landfill
425 Perinton Parkway
Fairport, NY 14450

Classification: Subtitle D facility
PCB Concentration Limit: 50 ppm
Approval to Accept CERCLA Waste that is otherwise Non-Hazardous:

- Yes. Documentation for approval is not available

Additional Requirements:

- Use a NYSDEC registered hauler

APPENDIX D

Property Access Agreements

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: Cindy Kane

Address: 501 Garibaldi
So Plainfields NJ

Description of Property: Corner
Garibaldi & Spicer

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

9-11-98
Date

Cindy Kane
Signature

C. Kane
Name (PRINT)

908-753-5772
Telephone Number

02-5840A:WPU078_1.WPD

RECEIVED DATE 9/11/98
RECEIVER JMN
Case NO 02-5840A
Subject Property Access
Copy To

ENVIRON

200170

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: AUGUSTO CHAVARRIAGA

Address: 500 GARIBALDI AVE
South PLAINFIELD
N.J. 07080

Description of Property: _____

_____

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

09-12-98
Date

Signature

AUGUSTO CHAVARRIAGA
Name (PRINT)

(908) 755-1336
Telephone Number

02-5840A:WP\7078_1.WPD

RECEIVED DATE 9/15/98
RECEIVER JMN
Case NO 02-5840A
Subject Property C Access
Copy To _____

ENVIRON
200171

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: MARGARET REIDY

Address: 704 Spicer Avenue
South Plainfield,
NJ 07080

Description of Property: One family, two story Colonial.

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

August 27, 1998
Date

Margaret Reidy
Signature

MARGARET REIDY
Name (PRINT)

(908) 757-9710
Telephone Number

02-5840A:WP\7078_1.WPD
RECEIVED DATE 8/31/98
RECEIVER JMN
Case NO 02-5840A
Subject Property Access
Copy To

ENVIRON

200172

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: DIWAN Puar

Address: 210 SPICER AVE
So PLAINFIELD
N.J. 07080

Description of Property: 210 SPICER AVE
So PLAINFIELD NJ.

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

9-1-98
Date

Signature

RECEIVED DATE 9/8/98
RECEIVER JMN
Case NO 02-5840A
Subject Property F Access
Copy To

DIWAN S. Puar
Name (PRINT)

908-754-4149
Telephone Number

02-5840A:WP\7078_1.WPD

Address for Pool Installer.
C & M Pools & Installation Inc
118 West Webster Ave. Roselle Park NJ 07204
PH # 201-241-0393.

ENVIRON

200173

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: FRANK J. RICCARDI

Address: 305 SPRUCE AVE
SOUTH LAKE
TEXAS

Description of Property: _____

_____

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

9-2-98
Date

Signature

FRANK J. RICCARDI
Name (PRINT)

908-754-3755
Telephone Number

02-5840A:WP\7078_1.WPD

RECEIVED DATE 9/8/98
RECEIVER JMN
Case NO 02-5840A
Subject Property Access
Copy To _____

ENVIRON
200174

CONSENT FOR ACCESS AGREEMENT

Name of the Owner: Mark S. Calderone

Address: 501 Hamilton Blvd
So. Plfd - N.J. 07080

Description of Property: _____

_____

I consent to employees, contractors, subcontractors, agents, or other authorized representatives of ENVIRON (collectively referred to as "ENVIRON") entering and having continued access to my property for the purpose of: (1) collecting soil samples relating to the investigation of subsurface contamination in the area; (2) surveying of the property; (3) establishing a "baseline" record of existing conditions including plant material, structures, etc. by written inventory and photographs; (4) removal of contaminated soil as necessary; and (5) replacement of the soil removed with clean soil and restoration of the property to the original baseline conditions established in (3).

I realize that these actions by ENVIRON are undertaken in conjunction with an action being conducted by the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), 42 U.S.C. §9601 et seq.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

I hereby certify that I am the owner or representative of the owner of the above-referenced property which will be affected by this Agreement. I am authorized to enter into this agreement.

9-8-98
Date

Mark S. Calderone
Signature

MARK CALDERONE
Name (PRINT)

908-668-4482
Telephone Number

02-5840A:WP\7078_1.WPD

RECEIVED DATE 9/17/98
RECEIVER JMW
Case NO 02-5840A
Subject Property Access
Copy To _____

ENVIRON
200175

APPENDIX E

Health and Safety Plan
for
Residential Property
Removal Action
South Plainfield, New Jersey

Prepared for:

ENVIRON Corporation
Princeton, NJ

Prepared by:

Robert C. Adams, CIH, CSP
ATC Associates, Inc.
New York, NY

September 25, 1998

CONTENTS

CONTENTS
(continued)

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the procedures to be followed by personnel implementing a removal action at six residential properties located in South Plainfield, New Jersey. This removal action includes the excavation, removal and transportation of polychlorinated biphenyl (PCB) contaminated soils.

This HASP has been developed in accordance with the requirements of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) and the United States Environmental Protection Agency (USEPA) Standard Operating Safety Guidelines (OSWER 1988). This HASP establishes the minimum requirements to maintain safe working conditions at the site.

This document will apply to any ENVIRON personnel working on this project. All contractors and subcontractors (Contractors) will be required to review site conditions and work to be performed to determine specific safety and health requirements for their personnel. Each Contractor involved in removal action activities at the Site will ultimately be responsible for the safety of its personnel and representatives. An agreement to comply with the requirements of the HASP must be signed by all personnel and visitors prior to entering work areas other than the Support Zone.

2.0 SITE DESCRIPTION

The remedial action work activities will take place at six residential properties located in South Plainfield, New Jersey. These properties are located along Spicer Avenue, immediately southwest of the Hamilton Industrial Park (The Site). The properties are identified as follows:

- 501 Garibaldi Avenue (Property B);
- 500 Garibaldi Avenue (Property C);
- 204 Spicer Avenue (Property E);
- 210 Spicer Avenue (Property F);
- 305 Spicer Avenue (Property I); and
- 501 Hamilton Boulevard (Property N).

3.0 CONTAMINANT CHARACTERIZATION

PCBs are the only contaminants of concern that have been identified at these properties. The PCBs were found in soils, with the highest reported soil concentration of 35 mg/kg on the property located at 305 Spicer Avenue.

4.0 ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

ENVIRON will provide health and safety oversight for Contractors involved in the project. Personnel working on the job must be qualified to perform the tasks that they are assigned. Contractors will ensure that personnel possess the necessary qualifications consisting of sufficient knowledge gained through experience and training to effectively execute the duties of their position. The Contractor is ultimately responsible for the health and safety of their own employees and representatives. Project personnel will be responsible to review this HASP, or the HASP to be prepared by the Contractor which must meet the minimum requirements set forth in this HASP, and acknowledge their understanding and compliance with its provisions by signing on the approval/ signoff sheet found in Attachment 1.

5.0 SITE SAFETY AND HEALTH OFFICER

The Site Health and Safety Officer (SHSO) is responsible for implementing the on-site elements of the HASP in the field. The SHSO will review this HASP with personnel working on-site prior to the start of excavation and transportation activities. In addition, the SHSO will implement any air monitoring required by this document. Based on the results of the sampling, the SHSO will determine whether the upgrading or downgrading of personal protection should occur, and will recommend changes to operations and controls in the event that worker or public safety or health is threatened.

6.0 HAZARD ASSESSMENT AND RISK ANALYSIS

6.1 Basic Safety Work Practices

To provide the safest working conditions possible, all site personnel must follow these basic safe work practices:

- Hard hats and sturdy work boots are required at all times in the work areas.
- Safety glasses/goggles/eye protection will be worn at all times.
- Hearing protection will be worn while performing high noise tasks, such as heavy equipment operation.
- Protective gloves are required when handling material that cuts, burns, or *contaminates the skin.*
- Good housekeeping will be practiced at all times.
- Access to safety and fire-fighting equipment will be kept clear at all times.
- Gasoline or diesel equipment will not be refueled when running.
- Horseplay, fighting, gambling and stealing will not be tolerated.
- No employee, other than the operator, will ride on trucks, loaders, shovels or moving equipment unless authorized.
- Immediately report all near incidents, accidents and injuries to your immediate supervisor.
- Report unsafe conditions or practices to your immediate supervisor.

- No one will be permitted to engage in work operations alone.
- Smoking, eating, drinking, and chewing gum or tobacco will not be permitted within the work zones.
- Personnel should keep track of weather conditions and wind direction to the extent these could affect potential exposure.
- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.
- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. These should be immediately reported to the site supervisor or the SHSO.

All employees, Contractors, and visitors will comply with all federal, state and local health, safety and environmental rules, regulations and ordinances while working at the properties.

6.2 Physical Hazards

The following chart lists the physical hazards that may be encountered during the excavation and transportation activities. Activities will be performed in compliance with applicable OSHA General Industry (29 CFR 1910) or Construction (29 CFR 1926) standards.

Tasks	Hazard	Preventive Measures
Excavation of PCB contaminated soils	Heavy equipment	Refer to Safety Procedure 1 in Attachment 2
	Open excavation	Refer to Safety Procedure 2 in Attachment 2
	Weather	Refer to Safety Procedures 3 and 4 in Attachment 2
	Heat	Refer to Safety Procedure 5 in Attachment 2
	Vehicle Operation	Refer to Safety Procedure 6 in Attachment 2
	Noise	Use hearing protection as discussed in section 8.1.

6.3 Chemical Hazards

PCBs have been identified as the only chemical contaminant of concern associated with the soil excavation. PCBs are a class of industrial chemical that contains 209 individual compounds. PCBs made in the United States were marketed under the trade name Aroclor and were identified by a four-digit numbering code in which the first two digits indicate that the parent molecule is a biphenyl and, for the 1200 series Aroclors, the last two digits indicate the

chlorine content by weight. For example, Aroclor 1254 has 54 percent chlorine. Aroclors 1254 and 1260 have been detected in the soils at the six properties subject to this Removal Action.

PCBs are generally clear, colorless to light yellow, viscous liquids or solids with a mild hydrocarbon odor. They have a low vapor pressure thus have a low volatility.

According to ATSDR, chronic (long-term) exposure to PCBs by inhalation in humans has been reported to result in respiratory tract irritation and gastrointestinal effects including anorexia, weight loss, nausea, vomiting, abdominal pain and mild liver effects. Effects on the skin and eyes include chloracne, skin rashes, and eye irritation.

6.3.1 Worker Chemical Hazard Assessment

- Inhalation:
  PCBs' low volatility makes the release of potentially significant levels of airborne vapor extremely unlikely, so that the most probable inhalation exposure would be to PCB-containing dusts generated during excavation. However, the low soil concentrations indicate that very high dust levels would need to be generated (see Section 10.0 Action Levels) for the current OSHA Permissible Exposure Limit (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) to be exceeded. Based on the low concentrations of PCBs in the soil, inhalation exposure potential is expected to be minimal. Further site controls described in Section 10.0 will eliminate the potential for such high dust levels.

- Direct Contact and Ingestion:
  Direct skin contact with soils and ingestion of soils is possible if proper hygiene practices are not followed at the work site. The use of protective gloves and covering exposed skin, and thorough hand, face and arm washing prior to eating, drinking or smoking will minimize skin absorption and ingestion potentials.

6.3.2 Residential Exposure Chemical Hazard Assessment

- Inhalation:
  As stated above, the low volatility of PCBs makes the generation of potentially significant levels of PCB vapor unlikely. Similarly, dust levels are not likely to be created that could pose potentially significant inhalation risk to residents (given the short duration of intrusive activities, the OSHA PEL or ACGIH TLV will also be used to define an action level for residential exposures). Further residents will not be

allowed in work zones during excavation activities, and site controls described in Section 10.0 will eliminate the potential for such high dust levels.

- Direct Contact and Ingestion:
  Direct contact or potential ingestion is also an unlikely route for residents, provided that the immediate excavation work areas are monitored, restricted to qualified site personnel only and secured during the workday. The excavation will be properly covered or backfilled during non-working hours; the immediate work areas will also be secured at night. Residents will not be allowed in work zones during excavation activities or in areas which have not been backfilled.

7.0 TRAINING

All personnel working on the excavation and removal of PCB-contaminated soils will have received 40 hour OSHA health and safety training in compliance with standards found in 29 CFR 1910.120(e) and will have maintained their training through annual refresher classes as required by 1910.120(e)(8). All personnel will be required to produce written certification of current training that meets the requirements of 1910.120 (e)(6).

All personnel, including any visitors, will be provided with a site orientation prior to entering the work areas. All personnel involved in the excavation or tasks involving potential direct contact with PCB contaminated soils will be trained on the proper use of personal protective equipment, site physical and chemical hazards, decontamination procedures, engineering and administrative controls, site emergency procedures, and this HASP. Site specific training will address the tasks to be performed and the measures to be followed to ensure the safety of personnel. Safety briefings will be held as needed, at least once every 10 days, and will include a review of any safety and health issues that are related to site activities.

8.0 PERSONAL PROTECTIVE EQUIPMENT

Personnel engaged in excavation activities will use personal protective equipment (PPE) to protect against site hazards. Selection of PPE is dependent upon the types and concentrations of hazards present and the operations to be performed.

Site personnel performing excavation activities during the project will use modified Level D protection. To ensure the safety of personnel, the level of protection may be upgraded based on visual observations of excessive dust generation, confirmation with a Mini Real Time Aerosol Monitor (mini-RAM or equivalent) and the judgment of the SHSO. The requirements for upgrading the level of protection are presented in Section 9. Each level of protection is outlined in the table below.

Level of Protection	Personnel Protective Equipment
Modified Level D	• Work clothes • Safety glasses • Hearing protectors (when needed) • Safety boots • Latex boot covers • Hard hat • Inner nitrile or latex surgical gloves with outer work gloves • Tyvek or other disposable coverall (for work tasks with the potential for contact with the PCB-contaminated soil (e.g., hand excavation activities))
Level C	• Full-face air purifying respirator (APR) with combination High Efficiency Particulate Air (HEPA) cartridges, NIOSH approved for protection against particulates and organic vapors, acid gases and formaldehyde • Work clothes • Safety boots • Hearing protectors (when needed) • Latex boot covers • Hard hat • Inner nitrile or latex surgical gloves with outer work gloves • Tyvek

9.0 MEDICAL SURVEILLANCE

All workers who will perform work on the project will be included in a medical surveillance program established by their own employer as required under 1910.120(f). At a minimum, medical examinations will include a medical and work history (or updated history if one is in the employee's file) and a current physical examination. Special emphasis will be placed on the symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under expected Site conditions, such as temperature extremes, that may be expected. No employee will be permitted to work on the properties without having received a medical clearance from a licensed physician.

10.0 ACTION LEVELS

This HASP identifies Action Levels (ALs) that have been established to ensure that the correct type of protection is used to protect personnel when specific conditions are encountered on the site. These ALs establish a trigger level which, if exceeded, require that a particular "action" be taken.

10.1 Action Level

In the preparation of the Action Level (AL), the results from the collection of soil samples that identified PCBs in the soil were reviewed. Using a maximum concentration of 35 milligrams of PCBs per kilogram of soil (35 mg/kg), an exposure limit for PCB-containing dusts was calculated using the following formula:

$$Action\ Level = \frac{EL\ (mg/m^3)\ (10^6)}{Soil\ Conc.\ (mg/kg)\ (Safety\ Factor)}$$

Where: EL = exposure limit (PEL or TLV)
Safety Factor = 10 (conservative factor based on adequacy of site characterization)

Substituting the values into the formula yields the following exposure limit:

$$\frac{0.5\ mg/m^3\ (10^6)}{35\ mg/kg\ (10)} = 1429\ mg/m^3$$

From this equation, the total dust concentrations in air would need to reach 1,429 mg/m^3 to create an airborne concentration of PCBs that would equal the PEL or TLV. Since the mini-RAM measures respirable dust particles, it has been assumed, based on prior experience, that approximately 50% of dust generated would be in the respirable range (less than ten microns in diameter). Therefore, the calculated exposure limit is divided by 2 to yield an AL of 714 mg/m^3. Dust generation of this magnitude would not occur under typical excavation work activities. Also, this AL is more than an order of magnitude higher than the total nuisance particulate standard of the ACGIH (TLV-TWA = 10 mg/m^3), the lowest published standard. Therefore, the nuisance particulate standard will be used as the AL. This AL is expected to be conservative for both workers and residents especially given the short term nature of the

potential exposure. Further, the AL based on the PCB PEL/TLV already incorporated a safety factor of 10 and this nuisance dust-based value is over 2 orders of magnitude lower.

10.2 Response to AL Exceedance

The AL will be used by the SHSO to determine when a modification to the site level of protection should occur. The SHSO will have the authority to make decisions regarding the upgrading or downgrading of PPE based on visual observation of dust generation, the results of direct-reading instrument measurements and TWA air sampling specific for PCB, if warranted.

To reduce the exposure to employees, the highest priority will be given to engineering controls and administrative controls. An example of an engineering control involves wetting the site to reduce the concentration of airborne dust. An example of an administrative control involves changing the work practices or procedures. The site supervisor will implement any controls that are required to avoid the exposure of site personnel.

When determined by the SHSO, TWA sampling specific for PCBs may be conducted to confirm the exposure and the airborne concentration of the contaminant. In addition, TWA sampling will confirm the results obtained using the direct-reading instruments.

11.0 AIR MONITORING

11.1 Scope of Monitoring Activities

Air monitoring will be conducted to identify and quantify concentrations of airborne dust to verify and determine the level of worker protection needed and to document the level of airborne contaminants that may potentially migrate from the site to the residential homes. During excavation activities, air monitoring will target the following areas:

- the excavation area at the Properties;
- the closest portal into the home (door, window, etc.); and
- the site perimeters (when indicated by visible dust generation).

11.2 Direct-reading Measurements

The SHSO will conduct monitoring using a mini-RAM aerosol monitor when work activities are likely to generate dust concentrations, or when visual observation of dust from site activities indicates the need to monitor.

The direct-reading instruments will be calibrated according to manufacturer's instructions prior to field use. Calibration of the mini-RAM will be performed before and after sampling each day that the instrument is used. Daily calibration checks of the instrument, areas where measurements were taken, instrument settings, and readings obtained will be recorded in the site safety and health logbook. The battery in each unit will be recharged after use to maintain a good charge.

When collecting measurements using the mini-RAM, the readings will be taken over a minimum period of ten minutes in an area or areas representative of the workers' breathing zone. The SHSO will record the average result for the interval. This strategy accounts for the variability in the concentration with time and avoids the situation where a decision to change PPE is made based on one instantaneous measurement.

A mini-RAM will be set-up at the nearest portal to the excavation and will continuously monitor the dust concentrations during the excavation work. The SHSO will monitor the mini-RAM at least once every 30 minutes. The date, time and concentration will be recorded in a logbook.

11.3 Time-weighted Average Sampling

Time-weighted average (TWA) sampling will be conducted during excavation activities to evaluate employee exposures to PCBs at the discretion of the SHSO. TWA sampling will be collected at locations that will represent the most exposed work group to obtain a "worst-case" determination of exposures.

TWA samples will be collected by drawing a known volume of air across a 37-millimeter (mm) glass fiber filter collection media over an 8-hour period. The sampling and analytical procedures to be followed for the collection, handling, and analysis of the TWA work area and perimeter area samples are those prescribed by NIOSH Analytical Procedure 5503. The calibration protocols described in the NIOSH methods will be followed. All analysis will be performed by a laboratory accredited by the American Industrial Hygiene Association.

11.4 Protocol for Sampling

Measurements at these locations will be made at various intervals during the shift as determined by the SHSO. The monitoring protocols are as follows:

Task	Type Sampling
Excavation, dump truck loading and associated tasks (tamping and residual clean-up)	Periodic Mini-RAM (Direct Reading) - every 30 minutes Time Weighted Average (as indicated by visual observation and mini-RAM monitoring)
Residential home portal	Continuous Mini-RAM (Direct Reading)
Site perimeter	Periodic Mini-RAM (Direct Reading) - every 60 minutes

12.0 WORK ZONES

Because of the nature of the excavation, work zones will be established at the beginning of each workshift. The exclusion zone will include the immediate excavation area, including the equipment, and will extend twenty feet from the excavation or to the nearest physical structure (building, fence) if feasible. The perimeter of the exclusion zone will be demarcated with "caution" tape or other visible marking. If feasible, the contamination reduction zone will be positioned immediately adjacent to the perimeter of the exclusion zone, upwind of the prevailing wind direction. A disposal container will be located in this area for disposable PPE. The support zone will be located in an area convenient to the exclusion zone, but located such that it does not block traffic or interfere with other nearby residences.

13.0 DECONTAMINATION

13.1 Personnel Decontamination

The first step in the decontamination of personnel wearing PPE will involve the removal of equipment that is visibly contaminated. A decontamination area will be established in the contamination reduction zone. Step by step procedures to be followed include:

Step 1	If boot covers are used, remove boot covers and place in disposal container; if boot covers are not used, step into boot wash.
[Step 2]	[Remove protective suit and place in disposal container]
Step 3	Remove outer gloves and place in disposal container
[Step 4]	[Remove respirator and cartridges. Place cartridges in disposal container; place respirator in designated bin for decontamination and cleaning]
Step 5	Remove inner gloves and place in disposal container
Step 6	Wash and rinse hands and face
Note: [ ] denotes optional steps for decontamination of level C equipment if required.	

13.2 Equipment Decontamination

To minimize the need for decontamination, unnecessary equipment and vehicles will not be brought into the contaminated areas of the site. Decontamination of the equipment will be the responsibility of the Site workers and Contractors under the direction of the site supervisor or designee.

14.0 EMERGENCY RESPONSE

Site personnel will be prepared to respond quickly in the event of an emergency. Emergencies may include illnesses or injuries, fires, vehicle accidents, spills, releases of hazardous substances or sudden changes in the weather. Local Emergency Response Teams will be called on to respond in the event of an emergency (see Table 14-1).

The site supervisor has primary responsibility for responding to and correcting emergency situations. The site supervisor is also responsible for insuring that corrective action measures have been implemented, appropriate authorities notified and follow-up reports completed.

Personnel working on the project will receive training to ensure that they understand the procedures to follow in the event of an emergency. This includes:

- Hazard Recognition;
- Signaling an emergency; and
- Evacuation routes.

The list of emergency contact phone numbers, provided in the table below, will be posted at all site telephones and vehicles. This list includes local emergency responders and medical facilities, and other agencies to be contacted in the event of an emergency.

Required emergency equipment locations on the site are as follows:

Eyewash:	Designated decontamination area
First aid kit:	Designated decontamination area
Fire extinguisher:	Designated decontamination area and on vehicles operating in the exclusion zone

The hospital or emergency care facility must be provided information concerning the nature of the emergency, who was injured, and any other information that will assist personnel in treating the injured worker. When calling for assistance in an emergency situation, the following information should be provided:

TABLE 14-1 Emergency Contact Phone Numbers	
Ambulance: South Plainfield Rescue Squad	911
Police: South Plainfield Police	911
Fire Department: South Plainfield Fire	911
Hospital General Number: Hospital Emergency Room:	908-668-2000 908-668-2200
Client contact:	617-832-1000
Poison Control Center	(800) 233-3360
CHEMTREC	(800) 424-9300
National Pesticide Information	(800) 845-6733

1. Name of person making call
2. Telephone number at location of person making call
3. Name of person(s) exposed or injured
4. Nature of emergency
5. Actions already taken

Recipient of call should hang up first--not the caller.

All injuries and illnesses must be immediately reported to the site supervisor. In the event of an injury or illness while on the job-site, first aid should be administered and an immediate determination should be made as to the need for further emergency treatment and/or transportation. Site personnel familiar with the incident should accompany any person transported to a hospital for treatment.

Any minor incident, not requiring hospitalization, should be handled by trained first aiders using first aid materials provided by them and maintained by the site supervisor. First-aid providers who may come in contact with or potentially come in contact with blood or other bodily fluids, should be informed about the requirements of the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030).

14.1 Route to Hospital

In the event that an injured person must be transported to the hospital, the following directions are provided to Muhlenburg Hospital (Hospital Route Map included in Figure E-1):

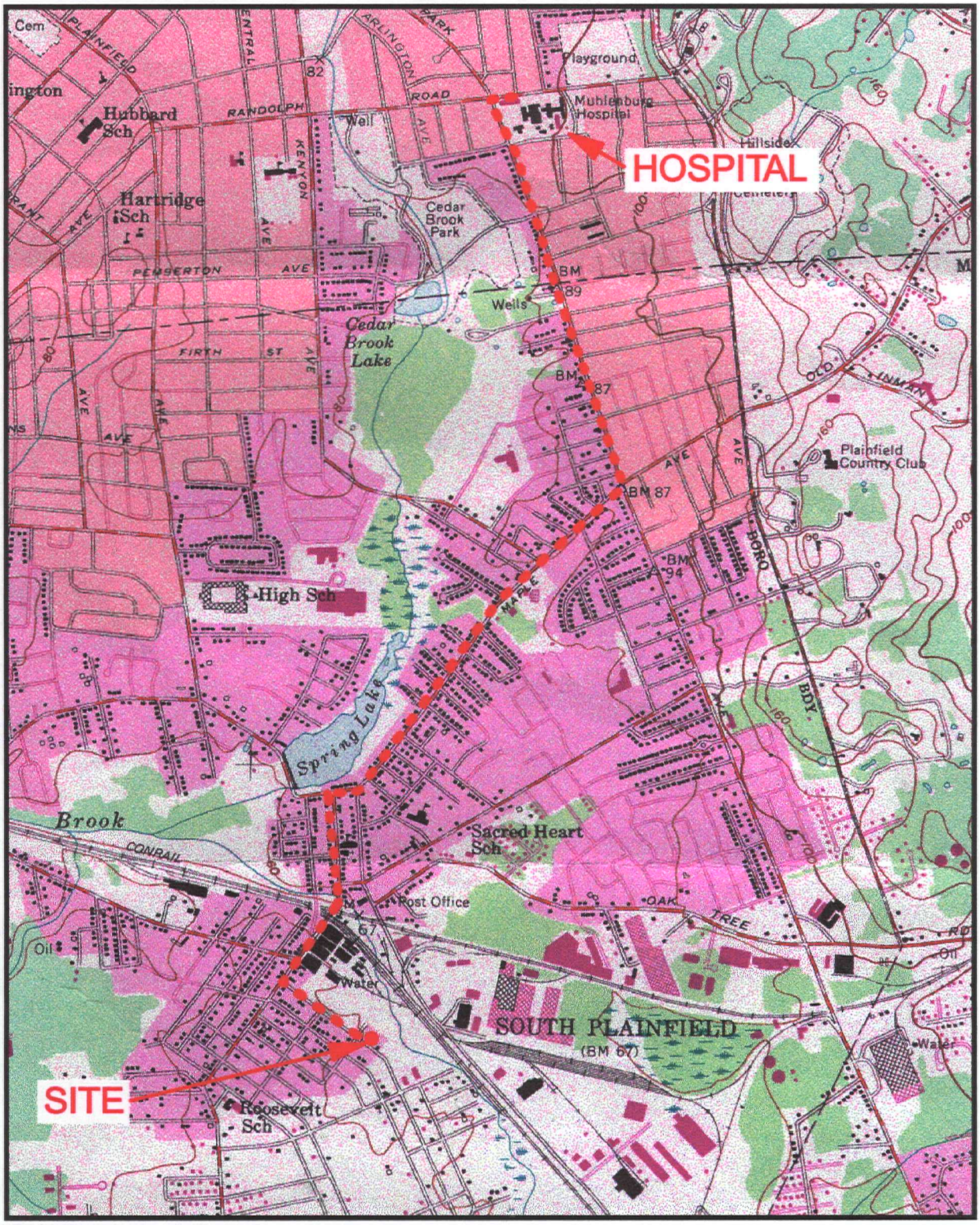
Turn west onto Spicer Avenue. Proceed to the corner and take a right onto Hamilton Avenue. Proceed to the first light and make a right onto Maple Avenue. Proceed on Maple Avenue to the next light and make a left onto Park Avenue. The hospital is approximately 1 mile down on the right. For the emergency entrance, proceed to the end of the block and turn right onto Randolph Avenue.

14.2 First Aid for PCB Exposure

The following first aid instructions for PCB exposure are from the NIOSH Pocket Guide to Chemical Hazards:

Eyes:

- Immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids.
- Get medical attention immediately.
- Contact lenses should not be worn when working with this chemical.



0 2000 4000

Scale In Feet

200200

SOURCE: USGS 7.5 MINUTE SERIES PLAINFIELD, N.J. QUADRANGLE, 1955, PHOTOREVISED 1981.

ENVIRON

DRAFTED BY: TJF | DATE: 9/25/98

ROUTE TO HOSPITAL

305 SPICER AVENUE
SOUTH PLAINFIELD, NEW JERSEY

FIGURE
E-1

5840AH01.PRE

Skin:

- Immediately wash the contaminated skin with soap and water.
- If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.

Inhalation:

- Move the exposed person to fresh air at once.
- If breathing has stopped, perform mouth-to-mouth resuscitation.
- Keep the affected person warm and at rest.
- Get medical attention as soon as possible.

Ingestion:

- If this chemical has been swallowed, get medical attention immediately.

15.0 SITE DOCUMENTATION

The site supervisor will maintain records of site briefings and a log indicating personnel working on the project and site visitors (see Attachment 1).

Training records will include, at a minimum:

- date, starting time and duration of training;
- topics covered, including any exercises performed or special instructions; and
- roster of personnel who attended.

A daily log of personnel working on-site will be maintained. This log will provide a reference if an incident occurs and an accounting of personnel is required.

16.0 EATING, DRINKING, AND SMOKING PRECAUTIONS

Since ingestion is a potential contaminant exposure pathway, eating, drinking, and smoking will be prohibited near excavation activities. Site personnel working in the excavation areas will complete the required personnel decontamination upon exiting and prior to eating, drinking, or smoking.

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ATTACHMENT E-1

Documentation Logs

Health and Safety Sign-Off Sheet

Name	Company	Date	Signature

Safety Briefing

ALL PERSONNEL PARTICIPATING IN THE PROJECT MUST RECEIVE INITIAL SITE HEALTH AND SAFETY ORIENTATION. THEREAFTER, A BRIEF TAILGATE SAFETY MEETING IS REQUIRED AS DEEMED NECESSARY BY THE SITE HEALTH AND SAFETY OFFICER (OR AT LEAST ONCE EVERY 10 WORKING DAYS).

Date	Topics	Name of Attendee	Firm Name	Initials

200206

Daily Personnel and Visitor Log

SITE WORKERS - SIGN IN DAILY DURING THE PROJECT.
VISITORS - VISITORS MUST FURNISH THEIR OWN PERSONAL PROTECTIVE EQUIPMENT. ALL VISITORS ARE REQUIRED TO SIGN THE DAILY LOG AND COMPLY WITH SITE HEALTH AND SAFETY PLAN REQUIREMENTS.

Name	Firm Name	Date	Site Worker or Visitor	Signature
			☐ Site Worker ☐ Visitor	
			☐ Site Worker ☐ Visitor	
			☐ Site Worker ☐ Visitor	
			☐ Site Worker ☐ Visitor	
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			☐ Site Worker ☐ Visitor	

ATTACHMENT E-2

Safety Procedures

200208

Safety Procedure 1
HEAVY EQUIPMENT OPERATION

Before any machinery or mechanized equipment is brought to the Site and used, it will be inspected and tested by a competent mechanic and certified to be in safe operating condition.

A competent person will be designated to be responsible for the inspection of all machinery and equipment daily and during use to make sure it is in safe operating condition. Tests will be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.

Preventative maintenance procedures recommended by the manufacturer will be followed.

Any machinery or equipment found to be unsafe will be removed from service and its use prohibited until unsafe conditions have been corrected.

Machinery and mechanized equipment will be operated only by designated personnel.

Seats or equal protection will be provided for each person required to ride on equipment.

Getting off or on any equipment while it is in motion is prohibited.

Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Exemption: Equipment designated to be serviced while running.

All points requiring lubricating during operation will have fittings so located or guarded to be accessible without hazardous exposure.

All repairs on machinery or equipment will be made at a location which will provide protection from traffic for repair persons.

Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment will be either fully lowered or blocked when being repaired or when not in use. All controls will be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

Mechanized equipment will be shut down prior to and during fueling operations. Closed systems, with automatic shut-off which will prevent spillage if connections are broken, may be used to fuel diesel powered equipment left running.

All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, will have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

Whenever the equipment is parked, the parking brake will be set. Equipment parked on inclines will have wheels chocked or track mechanism blocked and the parking brake set.

Personnel will not work or pass under the buckets or booms of loaders in operation.

No employee should use any motor vehicle, earth-moving, or compacting equipment having an obstructed view to the rear unless:

a. The vehicle has a reverse signal alarm distinguishable from the surrounding noise level, or

b. The vehicle is backed up only when an observer signals that it is safe to do so. Seat belts will be worn when the vehicle is in operation.

Riding on loads, fenders, running boards, or tailgates is prohibited. Legs or arms should be inside the vehicle at all times when the vehicle is in motion except to give appropriate hand signals.

Drivers should not operate vehicles until riders comply with all safety precautions.

Rollover protective structures (ROPS) will be installed on the following types of equipment:

rubber-tired, self-propelled scrapers,
rubber-tired front-end loaders,
rubber-tired dozers,
wheel-type agricultural and industrial tractors,
crawler tractors,
crawler-type loaders, and
motor graders.

Safety Procedure 2
EXCAVATION

- All excavating operations and work done in excavations must conform with established standards.
- Before opening any excavation, efforts will be made (including contacting the utility company or a "one-call" service) to determine if there are underground utility installations in the area. If utilities are in the area, the installation will be located and supported or moved during the excavation operations.
- If excavations are near walkways or roadways, guard or warning barriers must be placed to alert pedestrians and drivers of the presence of the excavation.

Safety Procedure 3
INCLEMENT WEATHER

Inclement weather conditions expected during the excavation, removal and transportation of contaminated soils include cold weather (ambient temperature levels below 40?F), rain, snow, ice and lightning. Inclement weather may be hazardous or add risk to site work activities.

Rain, Wet Weather and High Humidity

Rain and wet conditions increase slipping and tripping hazards, braking distances of vehicles and chance of slippage of other braking devices on augers, drills, etc. Rain fills holes and obscures trip and fall hazards and increases risk of electrical shock when working with electrical equipment. Rain changes soil conditions in excavating activities forming quicksand, weakening walls and increasing risk of cave-in. Vehicles can become stuck in mud and tools slip on wet surfaces.

Cold, Snow and Ice

In addition to cold stress, which is covered in a separate procedure, cold weather affects vehicle operation by causing window frosting, increased difficulty of starting and braking. Ice and snow accumulates on windows and mirrors and obscures vision.

Cold weather causes icing of roadways, driveways, parking areas, general work places, ladders, stairs and platforms which are wet. Ice is not always as obvious as snow or rain and requires special attention.

Snow increases risk of slipping when walking, climbing steps and ladders, working at elevation and of accidents when driving vehicles or operating heavy equipment. Heavy snow may cause electric lines to sag or break and use of electric equipment in snow increases risk of electric shock. Snow hides pot holes and mud, which can result in vehicles getting stuck or persons falling when stepping onto or into hidden holes.

Lightning

Lightning represents a hazard of electrical shock which is increased when working in flat open spaces, elevated work places or working near tall structures or equipment such as stacks, radio towers and drill rigs.

Precautions

- Monitor weather reports and plan daily activities with due consideration of weather impacts.
- Note changing weather conditions.
- Walkways, stairs, equipment ladders, and platforms must be kept free of mud, ice and snow.
- Vehicles used in rain or cold weather must have operable windshield wipers and defrosters. Windows and mirrors must be kept clear of obstruction.

- Operate vehicles within traffic laws, including modifying speed as dictated by weather conditions and wearing seat belts at all times.
- Manually pushing stuck vehicles is to be avoided.
- Suspend work in open areas, around drill rigs or other structures which may attract lightning and in elevated work places when lightning strikes are sighted or thunder is heard near the work site.

Safety Procedure 4
COLD WEATHER ILLNESSES

Four potentially serious conditions can result from extended exposure to the cold. These are hypothermia, frost nip, frost bite and trench foot.

Hypothermia is a condition in which the body loses heat faster than it can be replaced. The body's first attempt to preserve normal temperature is by constricting the blood vessels in the extremities. This slows the blood flow to the arms and legs, preserving that energy and warm blood for the body core. If there is continued heat loss and the body core temperature drops below 95° F, the body then tries to generate more heat through shivering. This is the first real warning sign of hypothermia. Further heat loss, accompanied by a body core temperature drop to 90° F or below, results in the following symptoms:

- Speech difficulty
- Sluggishness
- Mental confusion
- Loss of manual dexterity
- Slow reactions
- Muscle rigidity

When the body core temperature falls below 78° F, cold blood reaches the heart and the brain. Heart failure and coma will result and lead to death.

Frost nip is a localized freezing of the extremities, such as the ears, nose, toes and fingers. A dark bluish color may develop as a result of bleeding under the skin.

Frostbite occurs in temperatures that are below freezing. Frostbite is the freezing of living tissues with a breakdown of cell structure. It may result in the superficial redness of the skin (before skin becomes completely frozen), dull pain, slight numbness and blisters and skin discoloration (white, yellow-white or blue-white) when tissue becomes frozen. Frostbite may also occur if the skin contacts objects whose surface temperature is below freezing, such as metal tool handles.

Trench foot (immersion foot) is caused by continuous exposure to cold combined with constant dampness or soaking in water. Injuries include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death and ulceration.

Take the following precautions if working outside during cold weather:

Wear layers of loose, dry clothing;
Stay dry;
Keep head covered always. The head will transmit 75% of the body's heat loss;
Keep all exposed skin covered;
Avoid overheating. Remove clothing layers when starting to perspire;
Keep the extremities warm with periodic exercises;
Do not touch frozen metal with bare skin;
Use foot powder inside boots to absorb any moisture. Change socks if they become wet;
Avoid alcohol and smoking; and
Replace fluids by consuming sweet, warm, caffeine-free drinks or soups.

Safety Procedure 5
HEAT STRESS PREVENTION

Objective
The objective of this program is to establish guidelines, procedures and practices for the minimization of heat related illnesses associated with work in hot environments (outdoors or indoors).

Background
The following is a discussion of illnesses associated with work in hot environments:

Heat Stress
Heat stress is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body; the individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

- Symptoms - Red, hot, dry skin, although person may have been sweating earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; unconsciousness or coma.

- Treatment - Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak the victim in cool, but not cold water; sponge the body with cool water or pour water on the body to reduce the temperature to a safe level (102°F). Observe the victim and obtain medical help. Do not give coffee, tea, or alcoholic beverages.

Heat Exhaustion
Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

- Symptoms - Pale, clammy, moist skin; profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit, and may be dizzy.

- Treatment - Remove the person to a cool, air conditioned place, loosen clothing, place in a head-low position and provide bed rest. Consult physician, especially in severe cases. The normal thirst mechanism is not sensitive enough to ensure body fluid replacement. Have patient drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Total water consumption should be about 1 to 2 gallons per day.

Heat Cramps
Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. Heat cramps are often the first sign of a condition that can lead to heat stroke.

- Symptoms - Acute painful spasms of voluntary muscles, e.g., abdomen and extremities.

- Treatment - Remove victim to a cool area and loosen clothing. Have patient drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Total water consumption should be 1 to 2 gallons per day.

Heat Rash
Heat Rash is caused by continuous exposure to heat and humid air and aggravated chafing clothes. The condition decreases ability to tolerate heat.

- Symptoms - Mild red rash, especially in areas of the body that come into contact with protective gear.

- Treatment - Decrease amount of time in protective gear and provide powder to help absorb moisture and decrease chafing.

Heat Stroke
Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body; the individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

- Symptoms - Red, hot, dry skin, although the person may have been sweating earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; unconsciousness or coma.

- Treatment - Cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death will result. Soak the victim in cool, but not cold, water; sponge the body with cool water or pour water on the body to reduce the temperature to a safe level (102°F). Observe the victim and obtain medical help. Do not give coffee, tea, or alcoholic beverages.

Heat Stress Monitoring and Work Cycle Management
For strenuous field activities that are part of on-going site work activities in hot weather, the following procedures shall be used when appropriate to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. Awareness and limited monitoring procedures are to be instituted when the temperature exceeds 70°F.

- Measure Heart Rate - Heart rate should be measured by the radial or carotid pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beat/minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats/minute.

- Measure Body Temperature - With ambient temperatures over 90°, body temperatures should be measured with a clinical thermometer as early as possible in the resting period. Oral temperature should be taken at the beginning of the rest period before the employee drinks anything. Oral temperature (OT) at the beginning of the rest period should be shortened by 33%, while the length of the rest period stays the same. If the OT exceeds 99.6°F at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F.

- Measure Air Temperature - Measure the air temperature with a standard dry bulb thermometer. The thermometer bulb used will be shielded from radiant heat. Estimate fraction of sunshine by judging what percent the sun is out.

100% sunshine	=	no cloud cover	=	1.0
50% sunshine	=	50% cloud cover	=	0.5
0% sunshine	=	full cloud cover	=	0.0

Calculate an adjusted temperature by taking the actual dry bulb temperature and adding 13 times the % sunshine factor. For example, if the actual temperature is 85°F with 60% sunshine, the adjusted air temperature would be:

$$85 + (13 \times 0.6) = 85 + 7.8 = 92.8\,°F$$

- Work - Rest Schedule - The following suggested frequency of work/rest for **fit and acclimated workers** will be used as a guideline:

Adjusted Air Temperature	(Level D)	(Level C)
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F - 90°F(30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work

77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

The length of work period is governed by Frequency of Physiological Monitoring. The length of the rest period is governed by physiological parameters (heart rate and oral temperature). For example, if an individual's heart rate exceeds 110 beats/minute at the beginning of the rest period, that individual will remain on rest-time until his/her heart rate drops well below 110 beats/minute and their next work period (=duration of time before suggested physiological monitoring) is decreased by 33%.

Safety Procedure 6
VEHICLE OPERATIONS

General Rules and Responsibilities

The driver of any vehicle (dump truck, pick-up truck, etc.) is responsible to operate the vehicle in a safe and legal manner.

The driver and any passengers (if permitted) will use seat belts at all times when the vehicle is in motion.

The vehicle will be operated in accordance with all laws and regulations. Drivers will observe posted speed limits and adjust speeds for inclement weather conditions or adverse road conditions (such as traffic or road construction activities).

The vehicle will be operated with consideration and courtesy to pedestrians and other vehicular traffic. The driver will yield the right of way to avoid accidents.

The vehicle must be operated defensively. Drivers must be alert to conditions and anticipate hazards so that they can be avoided. Drivers must operate the vehicle in a manner that provides adequate space around the vehicle and provides time for the driver to see conflicts, take defensive steps and bring the vehicle to a safe stop. Drivers must avoid tailgating.

Vehicles must be visually inspected daily. Drivers will not operate any vehicle that is known to be defective or not in compliance with the law. All defects will be reported promptly and repairs made before the driver can operate the vehicle.

Backing accidents are a significant concern since the driver's visibility is usually limited. Drivers must make sure that mirrors are adjusted to give the maximum rearward visibility. Back-up alarms must be operable and capable of being heard over background noise. A spotter should be used in situations where the backing pathway is potentially congested or has limited clearance around the vehicle. Drivers should try to avoid backing whenever possible.

In the event of a vehicle accident, the driver, if capable, will:

- Render aid to any injured persons;
- take action to prevent further incidents by placing warning devices (reflectors or flares) on the roadway as necessary;
- report the accident to law enforcement and supervisory personnel as soon as possible;
- do not leave the scene of the accident unless permitted by a law enforcement officer.